S
338.9786
G13MSM
1980

The Montana Screening Matrix

A Study of Industrial Development Potential in Montana

STATE DOCUMENTS COLLECTI
SEP 20 2004
MONTANA STATE LIBRARY
1515 E. 6th AVE.
HELENA, MONTANA 59620

May, 1980

Governor's Office of Commerce
and Small Business Development

MONTANA STATE LIBRARY
3 0864 0014 8988 2

An earlier draft of this study was written by Western Analysis, Inc., Helena, Montana, under contract to the Montana Department of Labor, Employment and Training Division.

The Montana Screening Matrix

Introduction

This study attempts to identify opportunities for planned industrial growth which can be considered appropriate and acceptable within the State of Montana.

It is of critical importance to sustain the growth of the economy in the state and nation. Within the context of a rapidly changing economy, Montana's economic growth can be most stable when it is carried out with deliberate purpose, with direction, planning, and a methodical commitment.

The Montana Screening Matrix is intended to be a tool for community economic developers. Five-digit Standard Industrial Code (S.I.C.) product classes are identified which have significant potential for development. The results of the matrix can be valuable input to those developers and development planners in Montana who wish to jump out ahead of the pack. A wealth of analysis has already been done. Developers and planners may be able to set their priorities far more easily because of the information provided by the matrix.

In and of itself, of course, the matrix will not stimulate economic activity, create jobs, or build factories. It can not be considered as either a "top-down" or a "black-box" solution to Montana's occasionally sluggish economic performance.

Nevertheless, the potential benefits from the matrix approach for increased diversification and integration of Montana's industrial base are great. The long-run stability, health, and quality of Montana's manufacturing sectors may possibly undergo quantum improvements, but only through the dedicated work of Montana citizens. The quality of life, degree of opportunity, and general welfare of the State of Montana will coincide with the health of its basic economic sectors.

Background

The first large economic transaction involving Montana was the 1803 Louisiana Purchase. Later, in the 1860s, with the discovery of gold, Montana experienced heavy in-migration. Fortunes were amassed; city populations exploded. Montana was racing forward toward the 20th Century. The demand for lumber, food, clothing, and other goods aided in precipitating the expansion of the railroads. In addition to importing goods, the railroads had an enormously powerful effect on resource use and extraction in Montana. Great expanses of territory were opened up to agriculture, wood products, and mining development at a swift pace. Patterns of development activity were established which were to last.

Almost as quickly as they had been dug, the gold mines were depleted, a classic boom-and-bust syndrome. Because of the extreme dependence upon a single industry, the foundation of many local economies began to weaken drastically. There was little, if any, manufacturing activity to counteract the decline of metal mining. Without other job opportunities, a prolonged era of net out-migration began which was particularly pronounced among younger members of the labor force. Resource extraction was to persevere, however, as a major portion of Montana's economic base.

Up to the Present

The 1950s and 1960s were a continuation of the era of out-migration, although the trend began to decelerate. A major characteristic of the entire era was low employment expansion. Employment in mining had been consistently decreasing; agricultural production, more mechanized and centralized, required less labor. Throughout the period incomes were depressed.

In the 1970s the trend of out-migration ended; in-migration began. This occurred primarily because of significant employment expansion in the trades and services sectors, commonly known as the secondary or derivative sectors. In addition, more women entered the labor force as work habits changed. The increase in secondary sector employment during the 70s was a phenomenal 40%. Typically, though, derivative sector jobs pay less than primary sector.

The new growth of the 1970s has not been evenly distributed throughout the State of Montana. Some areas have continued to decline while others have undergone strong growth. This is due in part to demographic changes: the declining areas have been characterized by an older work force; the new, derivative sector opportunities have been concentrated in Montana's more youthful metropolitan areas.

Generally, employment in the basic sectors has changed in composition with agriculture and metal mining showing declines, wood products showing slight change, and non-metal mining growing due to the increased demand for Montana's coal resources. Nevertheless, total primary employment has declined approximately 2% since 1970.

Overall, Montana continues to be characterized by an over-reliance on single, unstable basic sectors.

The Future of Montana's Economic Base

Transportation will continue to play a key role in basic sector growth planning. Montana will tend to remain dependent upon agriculture and the state's natural resources, and the consequent export of them for processing, as its economic base. This is particularly the case when considering the massive level of energy resources contained within Montana's boundaries. Typically, manufacturing has taken place near consuming markets, except when the good has a high materials index (loses much weight and increases in value when processed, making transportation costs much lower, for example, logs to lumber).

The overall philosophy and aims of Montana's growth policy emphasize the following items:

- Montana's economic planning must strive to make the state's economy as self-sufficient and independent as possible;

- Montanans must have expanded opportunities to own, operate, and manage their own businesses;

- Jobs must be created in the private sector so that unacceptable levels of unemployment are avoided;

- Jobs and business activity should be distributed so that excessive growth occurs in no area that is unable to adequately accommodate that growth;

- The per capita income spread between Montana and the nation must be eliminated;

- Montana should have mechanisms that aid it in influencing major corporate or federal decisions that affect development in the state;

- The management and efficiency of the present production facilities within the state, particularly their use of energy and natural resources, should exemplify the state of the art;

- Transportation alternatives must be vastly strengthened to allow Montana producers to compete effectively in national and international markets; and,

- The awareness and understanding of all Montanans in regard to the benefits and costs of economic development must be improved to enhance the quality of public policy decisions impacting the future of the state's economy.

The primary purpose for such policy and planning activity is to address what the Governor's Council of Economic Advisors has identified as the three major sources of economic problems in Montana. These are:

1) Uncertainty in the primary economic sectors;

2) A non-diversified economy; and,

3) Non-dispersed and uneven growth across the state.

In essence, Montana's growth policy is meant to promote capital mobility, moving capital to its most economic and, if possible, socially beneficial use, guided by the hand of Montana's citizens.

Purpose and Function of the Screening Matrix

Defining the Matrix

The Montana Screening Matrix uses a methodology which attempts to identify specific 5-digit S.I.C.* product classes that exhibit plausible potential for development and production in Montana. The matrix analyzes 271 industrial groups (4-digit S.I.C.) and identifies those that have potential for Montana, then analyzes the product classes (5-digit S.I.C.) for growth and feasibility. The result is a list of product classes that, given recent trends, portray the appropriate criteria for industrial development in Montana.

Objectives

It has been emphasized that Montanans have expressed desire for a planned and orderly growth within the state. The Montana Screening Matrix approaches the issue by targeting upon two interrelated objectives: 1) employment expansion and 2) manufacturing sector growth.

*Standard Industrial Classification.

Wise policy must de-emphasize grandiose schemes and follow the prudent doctrine of augmenting the existing character of the economy. Current studies purport that most new jobs come about through the creation of new firms, or expansion of existing firms, having fewer than 20 employees. In the Rocky Mountain region, the studies point out that up to 70% of the new jobs are created by new small firms. A growth policy oriented toward small firms would certainly not be alien to Montana. As can be seen in Table 1 (next page), nearly 67% of all Montana's private wage and salary employees work in establishments employing fewer than 50 persons; roughly 46% of all Montana's private wage and salary employment is in firms with fewer than 20 employees. Whatever the national norm may be, development activities suggested by the Montana Screening Matrix will be most successful if the size and character of the state and local labor force is considered.

For any real improvement in the health of Montana's economy, manufacturing sectors must expand. Although it is not entirely quantifiable, there is a relationship between employment in the primary sectors and that in the derivative sectors. For each permanent job created in a primary sector, employment in the derivative sectors expands by a factor greater than one, but probably less than 2. Still, growth in the manufacturing sectors must be orderly, consistent, and planned.

Goals

Many Montana communities are presently subject to the effects of wide fluctuations in the demand for and price of their local economy's output--a single product. A sound economy, one that is relatively insensitive to cyclical business patterns, is a diversified economy. This type of economic structure is typified by an assortment of primary industries. The more and the greater the variance, the more diversified an economy will be; consequently, the economy will tend to be more stable. A diverse primary economic structure will have as its foundation a strong manufacturing infrastructure which will not be hurt by sharp changes in the demand or price of a single product.

The Montana Screening Matrix addresses the objectives of expanding job opportunities and improving economic health by promoting an improved manufacturing infrastructure. The goal is the diversification of local economies.

Table I

Montana Business Size Comparison

(Private Wage and Salary Employment)

1977

Business Size (employer)	Percent of Total Establishments	Percent of Total Employment
1-4	63.0	16.8
5-9	18.3	13.3
10-19	10.7	16.2
20-49	5.7	20.4
50-99	1.4	8.8
100-249	0.6	10.2
250-499	0.1	3.5
500-999	0.1	3.0
1000 -	0.1	7.8
	100.0%	100.0%

Sources: Western Analysis, Inc., Helena, Montana. Derived from County Business Patterns, Montana Summary, United States Department of Commerce, Bureau of the Census, 1976. 202 and 790 employment series, Research and Analysis Section, Montana Department of Labor and Industry, 1977.

* Note: excludes agriculture, government and non-farm proprietors.

There is another reason for promoting a stronger local economy. An economy that processes its resources from the point of their initial appropriation to the point of final production nets a greater economic gain: it is a fully integrated economy. The Montana Screening Matrix attempts to promote economic stability by emphasizing a need for increased integration in Montana's economy. By extending and building upon the present economic base, by promoting an integrated manufacturing infrastructure that increases the value of products produced in Montana, additional strides can be made in attaining the overall objectives of planned and orderly growth.

Function of the Study

As a planning tool, the Montana Screening Matrix can provide the state, sub-state, or local economic development planner with a way to fashion orderly development planning activity. The functions of the matrix are to indicate what types of manufacturing activity will tend to work, as derived from historical data, what is the appropriate size for Montana, and what is the most beneficial method of promotion.

Implicitly, it indicates also what will tend not to work; it de-emphasizes the concept of "smokestack chasing" as a way to approach the issue of industrial development and encourages a methodical and planned strategy utilizing the characteristics of particular areas to either attract new industry or to internally generate a new firm. Annually there are billions of dollars spent by large firms on branch expansion, but as distance increases from the site of the main office the possibility of capturing a branch plant diminishes. Approximately 90% of all the branch expansions are eventually located within 50 miles of the main office. Montana, being removed from larger industrial centers, will not attract many of these branch expansions.

Determinants of Industrial Location

In the analysis of industrial site location, it is difficult to precisely determine why a particular site has been selected for a manufacturing concern. Traditional economic theory bases its laws on the cost of transportation, utilities, taxes, and labor. These items are certainly important, but site-selection is a far more complicated process. There are other considerations that are brought into play and they vary in degree of importance.

Throughout the history of the industrial age, businesses have persevered in the face of many obstacles because of the innate abilities of a superior manager or entrepreneur. The location of the plant could be interpreted as a primary function of such skills and the individual's desire to succeed in a particular place--his location preference. Also, the national manufacturing structure tended to develop in a non-uniform manner: plants locating near other plants. Such selection indicates a relationship to an existing manufacturing structure. In more recent years, with vast improvements in the cost, reliability, quality, and speed of transportation, the site-selection process has become increasingly more vague. Nevertheless, the whole picture does show that patterns of industrial development do exist; groups of industries do have schemes or "sets of preferences" that may indicate the most desirable type of setting.

Therefore, two criteria are to be used for the present statewide analysis: first, the cost analysis and, secondly, an inspection of industry-specific "sets of preference."

Before moving to a more in-depth discussion of these two basic elements, one must note in passing that after a firm has decided on a suitable area (state or region) for development, it will begin to search out the community having the most appropriate attributes. Listed in order of importance, these are:

1) fire protection
2) contract trucking
3) police protection
4) trained worker availability
5) unskilled worker availability
6) air service (passenger)
7) tax incentives (local)
8) industrial zoning

Plant site features are also important at the community level. Listed in order of importance, these are:

1) interstate highway access
2) natural gas service
3) industrial water supply
4) rail service
5) sewage processing
6) solid waste disposal
7) soil load-bearing capabilities
8) air freight service
9) industrial parks

Costs of Production

Following traditional cost theory, labor, taxes, utilities, and transportation were selected as the basic elements influencing site selection. In this portion of the analysis, average Montana costs are compared to average national costs for each industrial classification.

Labor

Labor is the major single cost of most manufacturing operations, averaging 32% of an average firm's total costs. As can be seen in Table 2 (next page), Montana's index value for labor is 114, indicating that Montana's manufacturing wages average 14% higher than the national norm. There are reasons why Montana, an agrarian rural state, would have higher than national average wages for manufacturing. Primarily, the high wage level results from the particular industrial composition of Montana. The state has relatively few labor-intense, light-manufacturing firms and is disproportionately dominated by capital-intense industries, e.g., petroleum refining, wood products, food processing. This is quite a different industrial composition than the national norm. Another reason for higher wages may be that the capital-intense firm has a high output-to-labor ratio and may more readily acquiesce to demands of higher pay made by labor. Montana's labor force is approximately 65% more productive than the national average and its skill level tends to be higher. Therefore, a higher wage for capital-intense workers seems reasonable.

The Montana labor index (114) is probably not applicable, however, to the state's labor-intense firms. A closer inspection and consequent revision of the index was accomplished. The labor-intense index value was estimated to be 88: labor-intense firms in Montana pay 12% less than the national norm for those specific industry groups.

Dividing the labor cost analysis into two groups with distinctly different values more closely reflects the labor conditions of Montana's atypical industrial composition.

Utilities

Nationally, utility costs vary widely; the index value for Montana's utility costs in relation to the national norm is 50. It is inevitable that utility costs will continue to rise as these services grow more scarce in relation to increased demand. Eventually, too, the Bonneville Power Administration will restructure its rates upward, giving a less advantageous position to the industrial user. Relative to the nation, Montana's utility costs may still remain low, but how low is difficult to discern. Presently, utilities account for only 5% of the average cost of operation; but this may rise as the real price of utilities increases and Montana's less expensive utility services become a larger element in industrial location decisions.

Table 2

STATE COST COMPARISON INDEX VALUES

	Wage Rate	Electricity	Gas	Taxes	Transportation
Alabama	87	74	71	102	74
Arkansas	77	91	57	102	78
California	109	100	76	98	177
Colorado	106	93	53	85	116
Georgia	82	94	79	98	74
Idaho	102	46	82	98	158
Illinois	113	101	95	88	71
MONTANA	114	36	64	86	145
Nevada	112	76	78	114	162
New Jersey	106	152	122	68	90
New York	105	118	137	117	90
North Dakota	89	144	74	82	106
Oklahoma	92	73	55	93	88
Oregon	116	32	95	87	194
Pennsylvania	106	121	109	110	80
South Dakota	88	116	61	71	98
Texas	94	70	59	81	96
Utah	91	93	49	110	143
Washington	121	23	83	109	193
Wyoming	113	73	44	95	125

Taxes

The actual effect of tax incentives for new or expanding industries is a hotly debated issue. They can be attractive when a few areas use them, but if all areas offer a tax incentive package, the value of the package may become quite marginal. Regular business taxes remain a major consideration in the tax category, even though taxes average no more than 2.5% of the normal costs of business operation. Montana's relative status carries an 86 index value, or 14% below the national norm.

Transportation

On the average, transportation accounts for only 2% of the actual cost of operation with a range from .5% up to 7%. If Montana's transportation costs are measured in terms of ease of access to market areas, the costs are quite high. The indexed value is 145*, or 45% above the national norm. It is logical to assume that the export activity of areas most distant from major markets would be confined largely to raw materials export, or at least that their resources would be processed mainly to reduce their weight prior to transport. At present, most final processing of Montana raw materials tends to occur nearest the area of ultimate consumption. As can be seen in Table 3 (next page), Montana has very little manufacturing as compared to other land-locked states which have larger or are closer to market areas.

Non-Cost Location Criteria

Often firms will locate in an area that already has firms much like itself, or a firm may locate near its main supplier of inputs as with the proposed synfuel plants to be located in western coal fields. A firm may locate near a large available labor force. Industries, in general, are influenced to a degree by the external characteristics of particular sites and such influences contribute to what can be considered the optimum manufacturing site. These influences or set of "preferences" are known as linkages.

There are five basic types of linkages that are to be considered in the matrix. The definition of each is as follows:

Forward linkage: a firm that tends to locate near the consumer of its product has a forward linkage.

---

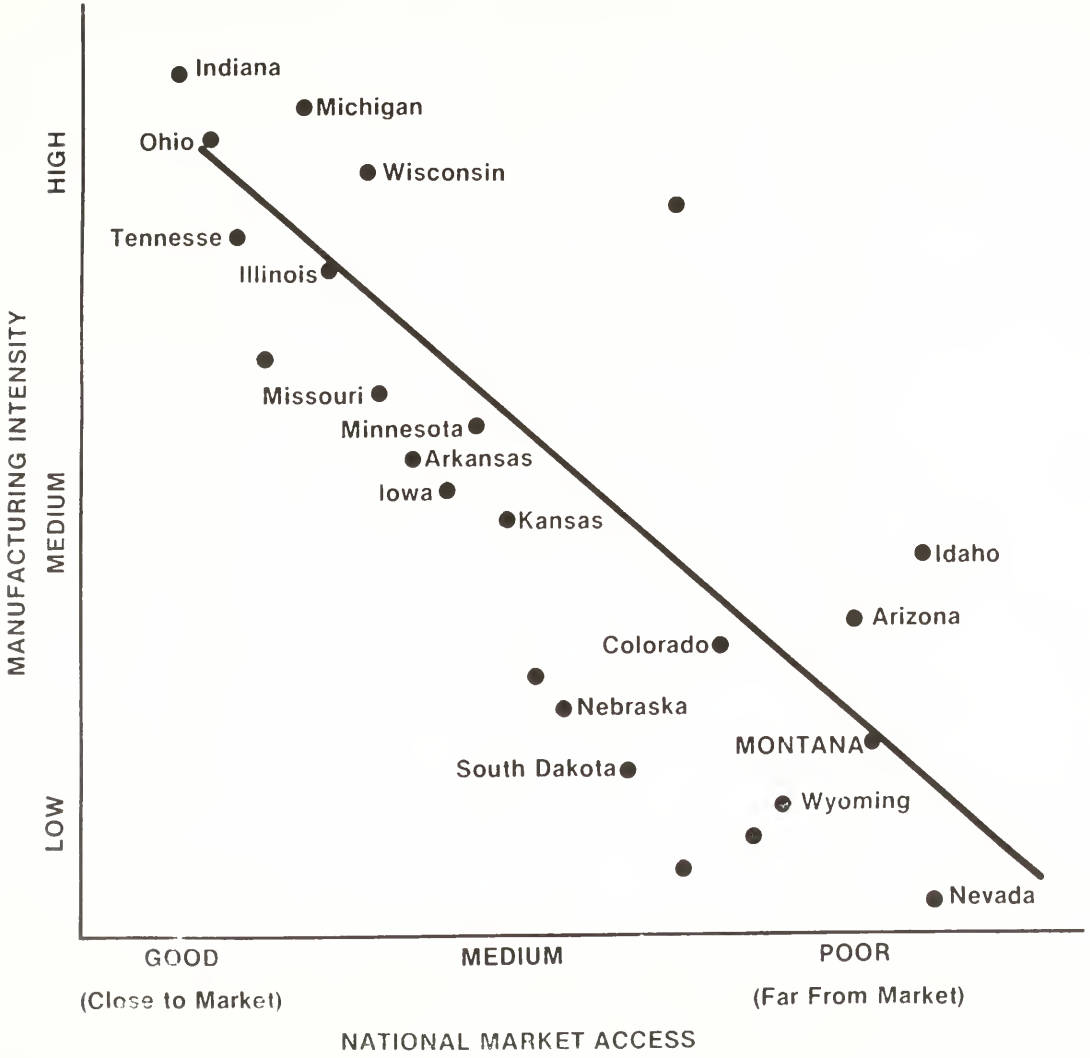
* The following algarithm was used to approximate market areas for each of the contiguous states:

$$\text{Market access}_{\text{State j}} = \sum_{j=1}^{48} \left(\text{population}_{\text{State j}}\right) \times \left(\text{Distance from State i to State j}\right)$$

All Data from the 1970 Census. Distances are computed between population centroids for each state, then totaled and averaged; the average is equal to 100. This represents a linear rather than a rail or highway distance.

Ta[illegible] 3

MANUFACTURING INTENSITY AND MARKET ACCESS



Backward linkage: a firm that tends to locate near its materials supplier has a supply or backward linkage.

Concentration dependence: a firm that tends to locate near other firms within its own major industrial category, in an effort to achieve some convenience or cost savings through sharing facilities and services, has a concentration dependence.

Urban orientation: a firm that tends to locate near metropolitan and urban areas because of the large available labor force, financial institutions, etc., is said to have urban orientation.

Raw material orientation: a firm that tends to locate near the source of its primary natural resource input has a raw material orientation.

Modern industrial location patterns are changing, differing from the type of location requirements that first arose at the initiation of the industrial age. Generally, industries are not bound as directly to the natural resources of an area as other influences have gained in importance. Also, many newer industries have arisen that outwardly indicate little, if any, unique location preference. Such a newer group is known as "footloose." Typically, the footloose firm produces goods that have a reasonably high level of value-added in processing or may tend to be highly technological.

Methodology

The methodology began with the collation of all available data at the 4-digit S.I.C. level. The available data includes general characteristics of desirability as well as the specific cost levels and location requirements for various factor inputs. In all, 25 industrial characteristics were drawn for 271 industrial categories. The 25 elements can be grouped into four main categories: labor, general costs, market structure, and other (see Screening Matrix Worksheet, next page) and are explained as follows:

1) Employment: average number of employees per establishment, U.S. Department of Commerce, Bureau of the Census, Census of Manufacturing 1967.

2) Wage rate: average hourly earnings, 1972 dollars. U.S. Department of Commerce, Bureau of the Census, Census of Manufacturing 1967.

Appendix A

Screening Matrix Worksheet

Industry _____ Industry No._____

SIC# _____

Industrial Characteristics:

1) Employment _____

2) Wage rate _____

3) Labor requirements _____

4) Female employment _____

5) Value added _____ %

6) Employment compensation _____ %

7) Business taxes _____ %

8) Rail _____ %

9) Motor freight _____ %

10) Electric utilities _____ %

11) Gas utilities _____ %

12) Composite cost _____ %

13) Growth rate _____ %

14) Market _____

15) Raw material orientation _____

16) Urban orientation _____ %

17) Concentration dependence _____

18) Linkages _____

19) Capital/labor intense _____

20) Product _____

21) Transportation costs _____

22) Rail shipments _____ %

23) Motor carrier shipments _____ %

24) Water use/discharge _____

25) Energy use _____

3) Labor Requirements: skill levels coded as S - skilled; SS - semi-skilled; C - unskilled. Derived from the 1970 Census of Population, U. S. Department of Commerce, Bureau of the Census, and RD Newsletter #53-70, Texas Agricultural Extension Service.

4) Female employment: the percent of female employment in each sector. 1970 Census of the Population, U. S. Department of Commerce, Bureau of the Census.

5) Value-added: value-added provides an indication of the degree of overall processing. This figure is expressed as a percent of total manufacturing costs, including labor, profits, and business taxes. The value-added increases as more processing takes place. Intermediate or partly finished products have lower value-added while final products have higher value-added. Data are from the 1967 (National) Input/Output Tables, U.S. Department of Commerce.

6-11) Cost figures: provide an indication of the relative importance of labor, utilities, and transportation costs to each industry. The figures are expressed as a percent of total manufacturing costs. Derived from the 1967 Input/Output Tables, U.S. Department of Commerce.

12) Composite Cost: this figure represents an overall cost index based on Montana's relative labor costs, taxes, utility rates, and transportation costs. It will be discussed more fully later.

13) Growth rate: percent increase in employment by sector (1960-1975). Employment and Earnings, U.S. Department of Labor, Bureau of Labor Statistics.

14) Market: markets are defined as local (coded L), regional (coded R), or national (coded N). R.D. Newsletter #53-70, April 1970, Texas Agricultural Extension Service.

15) Raw Material Orientation: an industry was coded X if a raw material orientation existed. R.D. Newsletter.

16) Urban orientation: the percent of firms located in urban areas. This variable ranged from 20 percent to over 80 percent. U.S. Department of Commerce, Industrial Location Determinants, 1971-1975.

17) Concentration Dependence: an industry with a concentration dependence was coded X. R.D. Newsletter.

18) Linkages: an industry with a forward linkage was coded F and an industry with a backward linkage was coded X. R.D. Newsletter and Battelle-Columbus Laboratories, Selection of Desirable and Feasible Industries, 1974.

19) Capital/Labor Intense: capital intense industries were coded C and labor-intense industries were coded L. R.D. Newsletter.

20) Product: intermediate products were coded I and final products coded F. R.D. Newsletter.

21) Transportation Costs: transportation costs relative to the value of the product were coded high (H) or low (L). R.D. Newsletter.

22-23) Rail and Motor Carrier Shipments: the percent of shipments made by either type of mode. Battelle-Columbus Laboratories.

24-25) Water and Energy Use: coded high (H), medium (M), or low (L). Battelle-Columbus Laboratories.

Screening the Data

The screening process involved three stages: the identification of highly footloose groups, appropriately linked groups, and the cost effective capital and labor intense groups.

Footloose Group

The process of identifying footloose groups involved the notion that they are widely dispersed and portray no particular or specific location requirements. The scheme involved the following elements:

1) No forward or backward linkages =2
A forward or backward linkage =1
Both forward and backward linkages =0

2) No concentration dependence =2
Concentration dependence =0

3) Urban orientation $<$ 40% =3
" " $\geq$ 40 $<$ 60% =2
" " $\geq$ 60 $<$ 80% =1
" " $\geq$ 80 $\leq$ 100% =0

4) No raw material orientation =2
Raw material orientation =0

With the above scheme, a possible range of 0 to 9 could exist and the actual distribution is exhibited on Graph #1 (next page). Those scoring in the uppermost categories of 7, 8, or 9 were most footloose and qualified as appropriate for further consideration in the matrix. That group is presented in Exhibit A (page following Graph #1).

The footloose group may have more potential as a group than most for location in Montana and fits closely the state's goal of diversifying local economies.

Linked Groups

The process of identifying the dominantly-linked industries required pin-pointing those industries directly related to Montana's present resource base or industrial structure. The scheme, which is essentially the antithesis of the above footloose analysis, is explained as follows:

1) Backward linkage, with any market, if applicable =2.
Forward and backward linkage, with regional or national market, if applicable; and forward, or forward and backward linkage, with a local market, if applicable =1.
No linkages, forward and backward inapplicable, or forward and backward with local market =0.

2) Concentration dependence exists and is applicable =2.
Concentration dependence doesn't exist =1.
Concentration dependence exists but is not applicable =0.

3) Urban orientation $< 40\%$ =3
" " $\geq 40\%$ $< 60\%$ =2
" " $\geq 60\%$ $< 80\%$ =1
" " $\geq 80\%$ $\leq 100\%$ =0

4) Raw material orientation, if applicable =2
" " " , but not applicable =0
No raw material orientation =0

The possible range of scores is 0 to 9 and the distribution spread is presented in Graph #2 (page following Exhibit A). Here, a score of 5 or better deserved further consideration and analysis. That group is presented in Exhibit B (page following Graph #2).

Note that the above screen filters out industrial categories that have a strong linkage orientation but are unrelated to Montana as well as the footloose industrial groups. The effort here is to identify industrial categories that may assist in the integration of Montana's economy, either through expansion or establishment of other similar industries.

Graph #1

Footloose Tendency

Distribution

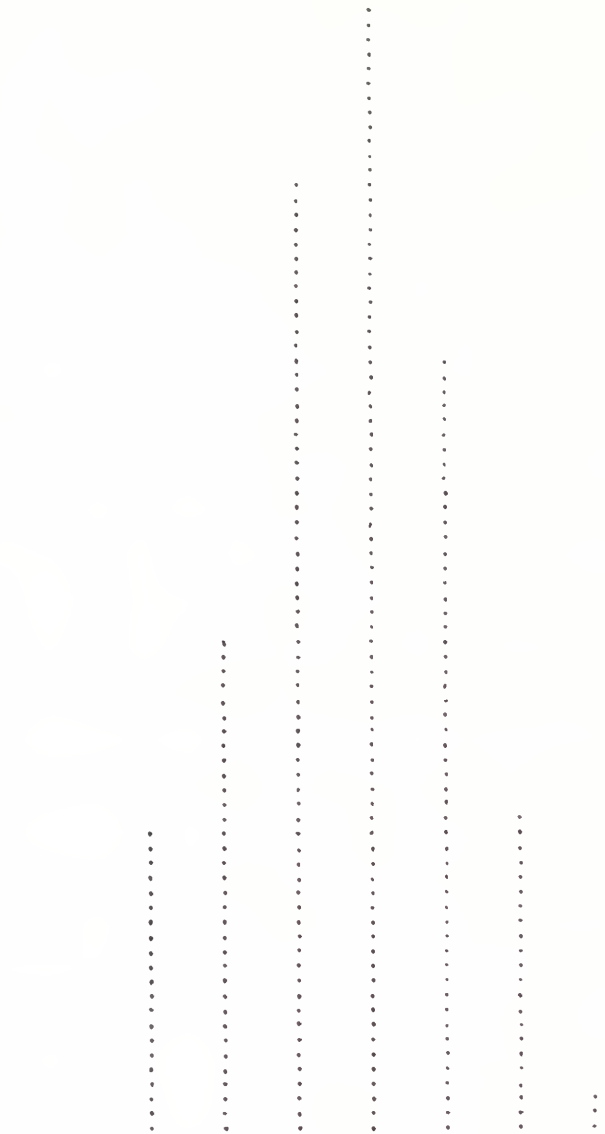


Exhibit A

Footloose Groups

Very High Potential

2086 Beverages (non-alcoholic)
2097 Manufactured ice
3334 Primary aluminum production

High Potential

2339 Womens & misses outerwear
2511 Wood household furniture
2521 Wood office furniture
2522 Metal office furniture
2642 Envelopes
2644 Wallpaper
2647 Sanitary paper
2646 Pressed molded pulp goods
265 Paperboard containers & boxes
2771 Greeting cards
2851 Paints, varnishes, enamels
2512 Upholstered household furniture
2514 Metal household furniture
2519 Wood household furniture
3299 Non-metallic products
3522 Farm machinery & equipment
3692 Primary batteries, wet & dry
3694 Electrical equipment for engines
3742 Railroad & streetcars
3691 Storage batteries
3699 Electrical equipment

Moderate Potential

2033	Canned fruits, veg., jam
2096	Shortening & margarine
224	Manmade fiber, silk finishers
227	Linoleum & floor covering
232	Mens/boys shirts
2327	Mens/boys trousers
2328	Mens/boys clothing
234	Millinery
2433	Prefab wooden buildings
244	Plywood containers
2531	Public building furniture
264	Building paper
2721	Periodical printing & publishing
284	Cleaning products
3261	Vitreous plumbing fixtures
3272	Other concrete products
3273	Ready-mix concrete
3275	Gypsum products
3293	Gaskets packing
3411	Metal cans
3532	Mining machinery & equipment
3421	Cutlery
3533	Oil field machinery & equipment
3537	Industrial truck & tractors
3561	Pumps & compressors
3562	Blowers & roller bearings
3564	Blowers & fans
3632	Household refrigerators
3633	Household laundry equipment
3634	Electrical housewares & fans
3639	Household appliances
3641	Electric lamps
3651	Radio/TV receiving sets
3674	Semiconductors
3732	Boat building & repair
3741	Locomotives & parts
3751	Motorcycles, bicycles & parts
3791	Trailer coaches
3799	Transportation equipment
3931	Musical instruments
395	Pens, pencils, crayons, etc.
3994	Mortician's goods
3425	Hand saws & saw blades
3429	Hardware

Graph #2

Linked Group

Distribution

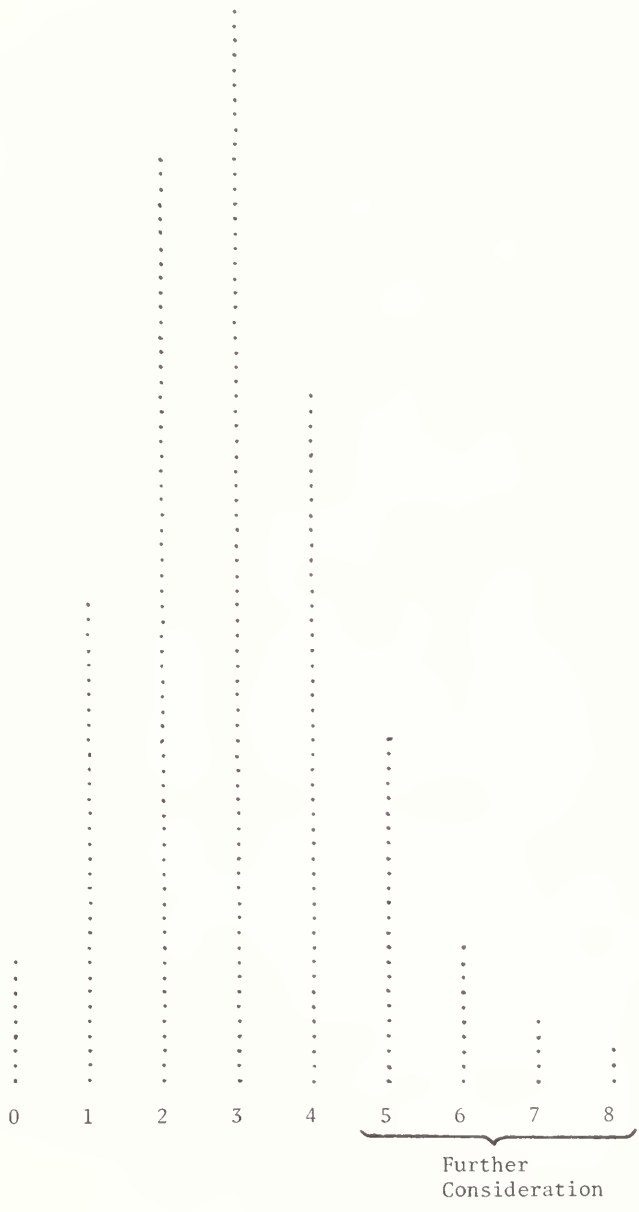


Exhibit B

Linked Group

201	Meat processing
2036	Frozen or fresh fish
2041	Flour & grain products
237	Fur goods
2386	Leather clothing
2432	Veneer & plywood
2611	Pulp mills
2621	Paper mills
2645	Die cut paper & cardboard
2711	Newspapers
273	Book printing & publishing
2741	Misc. publishing
275	Printing & engraving
2821	Plastics, materials, & resins
2824	Biological products
2911	Petroleum refining
2951	Petroleum coal products
3079	Misc. plastic products
3221	Glass containers
3331	Primary copper production
3332	Primary lead production
3333	Primary zinc production
3339	Primary non-ferrous production
3361	Aluminum castings
3611	Electric measuring devices
3612	Transformers
3613	Switchgear and switchboard appts.
3621	Motors and generators
3622	Industrial controls
3623	Welding equipment
3624	Carbon and graphite products
3629	Electrical industrial apparatus

Capital- and Labor-Intense Groups

The third screening process involved a cost analysis; one that is considered both social and industrial. It assesses the employment growth, water use, energy use, and "composite costs" for industry. The understanding of each of these four elements is critical in the final stages of analysis. Strong employment growth directly addresses one of the major objectives of Montana's economic development planning. High water and energy use by industrial users can come in conflict with the longer term stability of agricultural needs, environmental concerns, and power cost and supply considerations. The consideration of such costs is a response to the concern voiced by both the people of Montana and the Judge Administration. The "composite cost" figure is meant to represent the industrial cost, in relation to the national norm, that a firm would encounter in Montana.

A brief explanation of the generation of the composite cost figure is in order. The four cost elements discussed earlier--labor, utilities, taxes, and transportation--have been adjusted from national norms as follows: Capital-intense labor cost at 114, the light manufacturing or labor-intense labor cost at 88, utilities at 50, state taxes at 86, and transportation cost at 145. The sum of the national figures is divided into the sum of the Montana-adjusted figures to present the "composite cost." Perhaps an example will better explain the above discussion of composite cost:

Industry 2033 Canned fruits, vegetables, jam, etc.

At the national level, average costs are:

Transportation	4.4%	
Employee Compensation	14.7%	
Taxes	4.9%	
Utilities	.6%	
Total	24.6%	(of the value of $1.00 worth of output)

The costs as adjusted for Montana are:

Transportation	4.4% X 1.45	= 6.38%
Employee Compensation	14.7% X .88	= 12.94%
Taxes	4.9% X .86	= 4.21%
Utilities	.6% X .5	= .3%
Total		23.8% (of the value of $1.00 worth of output)

$$\frac{\text{Montana}}{\text{National}} = \frac{23.8}{24.6} = 96.9\%$$

Therefore, Industry 2033 would find that the cost of operation in Montana is roughly 3% below the national norm. In this fashion, the index values are used to estimate the cost of production in Montana relative to the nation. Note, too, that employee compensation for basic industries is often much higher than for other businesses. That, coupled with the capital-intense labor cost index value of 114, in many instances will push the cost of production quite high. A distribution of the composite cost figures for all industries deserving consideration indicates a bi-modal curve as shown on Graph #3 (next page). Both optimal economic considerations and social goals suggest promoting the labor-intense groups.

With the above considerations in mind, the following screening process was used to identify the final 4-digit S.I.C. categories that were to be inspected for feasible 5-digit S.I.C. products classes:

1) Employment Growth

≥ 25%	< 25%	=1
	< 50%	=2
	≥ 50%	=3

2) Energy Use

Low	=3
Medium	=2
High	=1

3) Water Use

Low	=3
Medium	=2
High	=1

4) Composite cost index:

Capital Intense		Labor Intense	
< 1.10	=3	< .85	=3
≥ 1.10 < 1.135	=2	≥ .85 < .9	=2
≥ 1.135 < 1.170	=1	≥ .9 < .95	=1
≥ 1.170	=0	≥ .95	=0

The possible range of scores is from 3 to 12 and those scoring 9 or more were chosen for their superior characteristics. A list is provided in Exhibit C (page following Graph #3).

Selection of the 5-digit Group

As one inspects more detailed levels of the Standard Industrial Codes, the available data becomes scant and unreliable. The only criteria available for use as a screening factor for the 5-digit group was rate of market expansion. And only a proxy was available for that factor: growth of shipments during the 10-year period 1967-1977: Exhibits D1 and D2 (pages following Exhibit C) list the members of the 5-digit group which emerge from this final screening because of their potential for rapid market expansion.

Graph #3

Composite Costs of Capital- and Labor-Intense Groups

Distribution

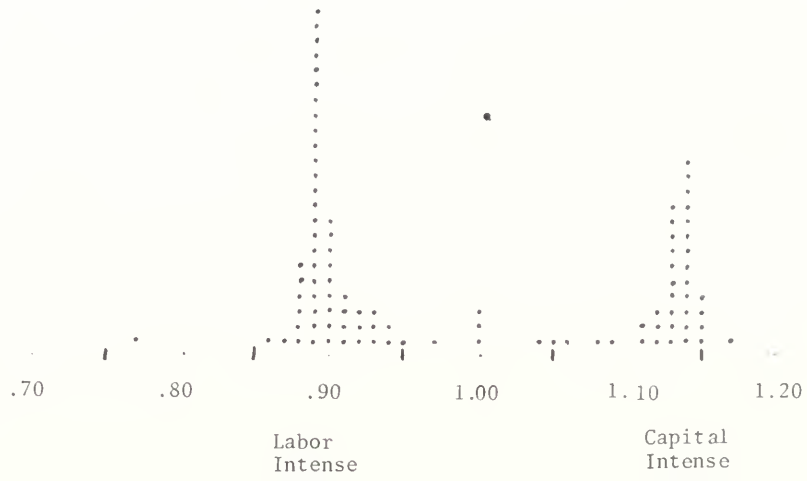


Exhibit C

Non-Prioritized List of Feasible

and Acceptable 4-Digit Industries

2097	Manufactured Ice
2339	Women's outerwear
2511	Wood household furniture
2514	Metal household furniture
2522	Metal office furniture
2647	Sanitary paper products
2646	Pressed & molded pulp goods
3361	Aluminum castings
3532	Mining machinery
3533	Oil field machinery
3537	Industrial trucks & tractors
3621	Motors & generators
3692	Primary batteries
3691	Storage batteries
3694	Engine electrical equipment
3699	Electrical equipment
3522	Farm machinery & equipment
395	Pens, pencils, crayons, etc.
265	Paperboard boxes & cartons
2831	Biological products
2521	Wood office furniture
2642	Envelopes
2644	Wallpaper
2771	Greeting cards
2512	Upholstered wood household furniture
2519	Wood household furniture
2327	Men's trousers
2328	Men's work clothes
2452	Prefab wood buildings
2531	Public building furniture
3272	Other concrete products
3421	Cutlery
3423	Hand edge tools
3425	Hand saws & saw blades
3561	Pumps & compressors
3564	Blowers & fans
3674	Semiconductors
3732	Boat building & repair
3751	Motorcycles, bicycles, & parts
3799	Transportation equipment
3931	Musical instruments
2711	Newspaper print
2732	Book publishing
2741	Other publishing
2751	Commercial printing
3079	Misc. plastic products

Exhibit D1

Capital Group

25141	Metal household dining & breakfast furniture
25221	Metal office seating
25223	Metal desks
25224	Metal cabinet, cases, etc.
26472	Sanitary tissue
26462	Pressed & molded pulp goods
35321	Underground mining machinery & equipment
35322	Crushing pulverizing & screening machinery
35323	All other mining machinery & equipment
35324	Mining machinery & equipment--parts & attachments
35231	Wheel tractors & equipment
35237	Plows and lifters
35331	Rotary oil field & gasfield drilling machinery & equipment
35322	Other oilfield & gasfield drilling machinery & equipment
35333	Oilfield and gasfield production machinery & equipment
36214	Other oil and gasfield machinery & equipment
36911	Storage batteries, S.L.I. type
36812	Other types of storage batteries
36941	Ignition harnesses & cable sets
36942	Battery charging generators
36943	Cranking motors
36992	Lamp, bulb components, etc.

Exhibit D2

Labor-Intense Group

23393	Women's outerwear
25113	Wood dining room & kitchen furniture
25210	Wood office furniture
26493	Wallpaper
25190	Household furniture
22720	Tufted carpets & rugs
23282	Men's work clothes
32722	Precast concrete products
32723	Prestressed concrete products
34231	Mechanics hand service tools
35612	Hydraulic fluid power pumps
35615	Pumps & pumping equipment
36741	Integrated microcircuits (semiconductor networks)
37327	All other boats (sailboats, rowboats, canoes, etc.)
39314	Other musical instruments (wind, fretted non-electric, & string
27411	Catalog & directories (publishing)
27412	Business service publications
27520	Commercial printing, lithograph

Benefits and Limitations of the Montana Screening Matrix

Benefits

The primary benefit is the indication of plausible and feasible candidates for industrial development in Montana, particularly the labor-intense group which is better able to address the goal of increased primary employment for the state.

More generally, the Montana Screening Matrix can function as a tool for state, substate, and local development entities. It aids in the pinpointing of industries that may be able to operate efficiently in Montana. The matrix itself is an effort to dispel the typical problem that many development organizations have encountered: when not knowing what it wants or what tends to be more immediately possible, the development organization may lean toward little more than "smokestack chasing"--an approach that may involve a degree of waste.

The matrix may also give the developer a better understanding of the reasons behind site-selection decision making and what it may and may not involve. As well, the diversification and integration that are presently relatively non-existent in Montana's economy have been addressed. It is through efforts to expand the economy by means of diversification and integration that real and long-term socially beneficial development can occur.

Limitations

This screening matrix is a study derived from historical data. It presents what has happened in the last few decades in the field of industrial development and expansion. But, being a study based on historical trends, it can not portray the direction or project the viability of new or emerging technologies, products, or process changes. Therefore, the matrix should be considered a list of potential development candidates for the near-term.

Another consideration is that one of the most important elements in the success or failure of a firm is the ability of its management. It was stated earlier that, in the genesis of industrial development, industries often persevered and remained profitable because of a superior entreprenuer or manager. This condition still exists.

Still another aspect of the limitations of the matrix must, in all fairness, be pointed out. That is in the data. For example, if the growth in shipments has been evaluated as "high," and used as a proxy value for expanding markets, potential for future expanded production is reasonably assured. Perhaps the growth of shipments can most easily be taken care of by the excess capacity of existing firms; consequently, the establishment of another plant may not be the most efficient way to respond to the market demand. In point, a certain amount of care

and caution must be used when acting upon the recommendations cited in the matrix. Every developer should be able to select an item for the particular area desired for development; yet, additional comparison of that product class to local characteristics would be wise.

Lastly, let it be re-emphasized, the matrix is a tool. In and of itself, the matrix will not develop an area.

THE MONTANA SCREENING MATRIX

WESTERN ANALYSIS

January 15, 1979

Mr. Bruce H. DeRosier
Executive Director
Governor's Employment and
Training Council
Office of the Governor
Capitol Station
Helena, Montana 59601

Dear Mr. DeRosier:

The following report entitled "The Montana Screening Matrix" provides a general overview of location determinants as they may effect manufacturing development in Montana.

The document is a working document in the sense that it opens more questions than it answers. It is, however, my opinion that the report, particularly the Appendix, should provide state planners with an improved data base and evaluation process for manufacturing development.

Clearly, the document will not create jobs, but if properly used may help communities to focus on realistic possibilities.

As you are aware, manufacturing growth in Montana is faced with numerous constraints. However, the full extent of the state's potential remains unknown. Perhaps this report will shed some light on why Montana is not a "manufacturing state" but more importantly help to suggest what types of development are plausible.

Sincerely,

Bruce Finnie

Bruce Finnie
Vice President

BF:cm

P. O. Box 287 • Helena, Montana 59601 • Telephone (406) 443-3420

Table of Contents

	page
Introduction	1
Background	1
An Overview of Montana's Economy	3
Determinants of Location	7
Labor Costs	9
Utilities	10
Taxes	10
Transportation	11
A State Overview of Costs	13
External Linkages	16
Raw Material Orientation	17
The Screening Matrix	17
Comparison of Industries	25
Common Characteristics	26
General Comments on Specific Industries	29
Desirability Criteria	34
Site Specific Criteria	34
Other Extensions	35
A General Comment on Community Development	35
Conclusions and Suggestions	36

APPENDIX

I) Industry Ranking

II) Screening Matrix Data

THE MONTANA SCREENING MATRIX

Introduction

The Judge Administration has placed high priority on the improvement of employment and income opportunities in Montana. In an attempt to foster acceptable manufacturing growth in the state it is necessary to begin to develop a base of support information so that development programs can proceed in an orderly fashion. Therefore, the purpose of this document is to develop an initial screening system which will help match state and community characteristics with manufacturing industry location requirements.

Background

In recent years federal, state, and local government agencies have embarked upon a policy of encouraging industrial development in slow-growth regions. Often, such development programs have pursued a "shotgun" approach to growth by encouraging any and all forms of development without regard to economic feasibility. Such efforts were frequently characterized by mass promotional mailings, expensive advertising campaigns and the aggressive promotion of "outside" industrial development. The success rate of this type of development program has generally been very low if even measurable. It is the author's contention that the efficiency and effectiveness of development programs may be enhanced by focusing or "targeting" attention on those types of industries which "appear" to be "most realistic" given the needs of specific types of business and the advantages

that particular communities may offer. In other words, there is a need to assist local developers in Montana in identifying feasible industries for their communities. Feasible is defined as a certain set of industries that may operate economically in a particular Montana community being evaluated in terms of their most important factoral inputs such as labor, transportation, energy, and other considerations.

Clearly, the "screening matrix approach" cannot be classified as scientific. There is no way possible that economic developers may be fully aware of the exact locational determinants that influence the development of an industry in one area as opposed to another. However, many industries may be systematically dropped from consideration on economic grounds. The remaining industries may then be subjectively scored in terms of feasibility or desirability in such a manner as to be more consistent with the goals and economic advantages of each community.

This approach, while relatively new, has recently been adopted by several states including Washington, Missouri, and Nebraska. Although it is premature to evaluate the effectiveness of their efforts it is the author's opinion that the "more objective" approach may have several benefits to local development planners. These benefits may include: 1) more carefully identified targets for solicitation programs, 2) improved insight into the nature of locational determinants, 3) improved community brochures and profile materials, and 4) a consistent set of development goals matching feasible industries and acceptable industries as defined by each community.

In short, the screening approach presents a community with an orderly approach to more realistically assess their growth potential. However, that simple fact remains that any amount of analysis will not by itself have an effect on either income or employment opportunities without a long-term and sincere commitment on the part of the local business community to influence their own future. Quite simply, community development is a home grown product, the success of which almost exclusively rests in the hands of local businessmen.

An Overview of Montana's Economy

Historically, Montana's economic role has been the specialized one of providing raw materials for the national marketplace. As a result of the state's natural resource base, the economy has been largely resource, rather than market oriented, so the importance of manufacturing products for final consumption has been relatively low. In addition to such natural factors, this resource orientation has been partly reinforced by geography and the resultant relatively poor access to national markets. Without any doubt, the resource based industries (agriculture, mining and wood products) have provided the basis for the long-term development of the state, and in all likelihood it is these industries which will determine the future of Montana. Concentration in these industries has not been accidental, but rather the result of natural market forces.

Economists frequently classify employment as being either basic or nonbasic within a given region. Basic employment is defined as those jobs which bring money into the region, generally through exports. On the other hand, nonbasic jobs are assumed to draw their

livelihood from the basic jobs. That is, if there were no basic employment, there would be no nonbasic employment.

The following table reveals that nearly all of the employment growth in Montana has been in the nonbasic category while basic employment has remained virtually unchanged since 1960. Some individual basic sectors have increased but others have declined, resulting in a stable level of overall basic activity. This situation is not unique to Montana but is true for the nation as well.

There are several factors which have contributed to this uneven growth. First, basic sectors have steadily become more capital intense, requiring fewer workers to produce either the same or an expanded amount of output. Second, the labor force has rapidly grown particularly in certain age groups. For example, in Montana the number of individuals between the ages of eighteen and twenty-two increased by 54% from 1970 to 1977. During the same period, total state population increased by slightly less than 10%. Third, there are far more married women working today to supplement family income than there were just a few years ago.

With more people looking for work, and fewer required in the basic sectors, it is not surprising that nonbasic employment grew rapidly. Even though many of these new jobs are part-time and low paying, much of the real income growth in Montana can be traced to this nonbasic expansion. And, as income increased in both the basic and nonbasic sectors, this further stimulated the demand for more and more nonbasic employment.

Even though this nonbasic expansion has resulted in greater income, the real future of Montana's economy still is dependent on the

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Agriculture	39.0	37.3	38.2	38.3	36.6	35.2	37.1	37.3	33.6	34.1	36.1	35.0	33.1	36.3	38.8	34.8	33.4	35.7
Lumber & Wood Products	7.3	7.4	8.0	8.5	8.4	8.6	8.9	8.7	8.9	8.9	8.2	8.7	9.2	9.8	9.5	8.1	9.1	9.3
Primary Metals	3.8	3.6	3.5	3.2	3.3	3.6	3.9	3.2*	3.7	4.6	4.7	4.1	3.9	3.4	3.4	3.3	3.2	3.2
Food Products	4.3	4.3	4.4	4.4	4.5	4.3	4.3	4.4	4.3	4.3	4.3	4.2	4.2	4.3	4.1	3.5	3.8	4.0
Refining	0.9	1.0	1.0	1.2	1.2	1.1	1.0	1.0	1.0	0.9	1.1	1.0	1.1	1.1	1.1	1.1	1.3	1.1
Other Manufacturing	2.4	2.4	3.5	3.5	2.5	2.9	3.1	3.4	3.6	3.6	3.8	4.1	4.2	4.3	4.5	4.2	4.2	4.6
Metal Mining	4.5	4.2	3.8	4.1	4.8	4.6	4.8	3.2*	2.3*	3.3	4.0	2.9*	3.7	3.8	4.0	3.1	2.4	2.0
Coal	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.2	0.3	0.3	0.4	0.7	0.9	0.9
Non-Metal Mining	0.7	0.7	0.8	0.9	0.9	1.1	1.1	1.0	1.0	0.8	0.8	0.7	0.7	0.8	0.9	0.8	0.6	0.7
Oil & Gas Extraction	2.2	2.2	2.2	2.1	1.9	1.8	1.7	1.7	2.2	2.3	1.8	1.6	1.6	1.6	1.8	1.8	2.0	2.5
Heavy Construction	2.8	4.0	4.7	4.1	4.1	4.5	4.3	4.1	4.9	4.6	4.7	5.1	3.5***	4.0	3.3	3.8	3.8	4.7
Rail Transportation	9.0	8.4	8.1	7.9	7.7	7.5	7.5	7.2	6.9	6.8	6.6	6.4	6.4	6.3	6.5	6.1	6.1	6.3
Federal Government	9.9	10.9	11.5	12.0	11.8	12.1	12.4	12.7	12.3	12.0	11.9	11.9	12.3	12.2	12.9	14.2	13.7	14.1
TOTAL BASIC	86.8	86.4	89.7	90.2	87.7	87.3	90.1	87.9	84.7	86.2	88.0	85.9	84.2	88.2	91.2	85.5	84.5	89.1
Other Construction	8.2	7.3	7.9	8.2	7.3	7.5	7.3	7.6	6.6	5.9	6.3	6.6	7.9	9.0	10.2	8.3	9.7	11.0
Other Transportation	4.0	3.9	3.9	3.8	3.8	4.0	4.1	4.4	4.5	4.6	4.6	5.0	5.1	5.7	6.0	5.6	5.7	6.1
Utilities and Communications	6.0	6.0	5.9	5.9	5.9	6.0	6.1	6.2	6.2	6.2	6.2	6.3	6.4	6.7	7.0	7.3	7.4	7.8
Trade	40.5	39.8	40.3	41.1	41.7	42.9	44.2	44.5	45.5	47.0	48.1	50.1	53.5	56.3	58.8	59.1	63.0	66.1
Services (including publishing)	24.8	25.1	25.7	25.9	26.6	28.0	29.1	30.6	32.3	33.9	35.5	37.2	39.2	42.3	44.3	46.2	49.7	51.4
Finance	6.9	6.8	6.8	6.8	6.9	7.0	7.2	7.2	7.6	7.9	8.1	8.5	9.0	9.4	10.0	10.2	10.6	11.4
State and Local Government	28.6	29.1	29.7	31.0	32.9	33.8	35.7	39.1	41.0	40.1	40.7	42.5	43.1	43.2	45.3	50.7	52.0	56.1
Non-Farm Proprietors	22.8	22.7	23.1	23.5	24.0	24.8	25.7	26.3	26.5	29.8	30.2	31.3	32.6	32.5	32.6	32.6	35.7	38.5
TOTAL NON-BASIC	141.8	140.7	143.3	146.2	149.1	154.0	159.4	165.9	170.2	175.4	179.7	187.5	196.8	205.1	214.2	220.0	233.8	248.4
TOTAL EMPLOYMENT	228.6**	227.1	233.0	236.4	236.8	241.3	249.5	253.8	254.9	261.6	267.7**	273.4	281.0	293.3	305.4	305.5**	318.3	337.5

Sources: Montana Employment Security, Research Division
U.S. Department of Commerce, Regional Economic Information System

* Strike
** Recession
*** Libby Dam

health of the vital basic sectors. These jobs generally pay nearly twice as much as the average nonbasic job. Furthermore, when basic jobs increase there is a "tendency" for nonbasic jobs to grow somewhat faster.

The primary purpose of this brief review is to point out to local developers that there has been relatively little manufacturing growth (or basic employment growth) in Montana in the last several decades. Since 1960 manufacturing employment in Montana has increased by a modest 19 percent when compared to total employment increases of nearly 40 percent. However, it is important to keep in mind that the national experience has been much the same with increases in nonmanufacturing activity far exceeding manufacturing growth.

Another point to keep in mind is that Montana's overall economic performance has been far better during the 1970's than in either of the two previous decades. During the 1950's and 1960's many Montana residents were forced to leave the state because of inadequate job opportunities. However, today there are more individuals who are choosing to live in Montana than are leaving. Increased employment growth has been largely responsible for this reversal of migration patterns. However, this growth has not been uniform with most of the growth occurring in a handful of Montana communities such as Billings, Bozeman, Missoula, Helena, and Kalispell. The rest of the state has not been so fortunate.

Many areas in Montana still have and are expected to have very slow employment growth and continued out-migration. Many of these slow growth areas have an economic base which is either

stagnant, declining, or tied to a single industry, commonly resource based. These same areas both need and apparently want new jobs the most. Unfortunately, these areas will probably face the greatest difficulty in either attracting or internally developing new jobs. The very fact that they are underdeveloped suggests that limitations may exist as to the types of industries which may be successfully developed.

Even the larger and more prosperous communities within Montana are faced with numerous constraints as to the type of activity which could realistically occur. A recent survey (U.S. Department of Commerce) of nearly three thousand national manufacturing firms revealed that slightly over half of those industries preferred cities with a population greater than 100,000. Furthermore, most respondents indicated a desire to be located within or at least near a metropolitan area. It is the opinion of the author that if manufacturing growth is to occur in Montana, community developers should begin to focus their attention on those industries that are not directly tied to urban areas. And secondly, discretion should be used so as not to promote growth that may not be consistent with the long-run desires and goals of the community. The purpose of the screening approach is to assist in minimizing such conflicts.

Determinants of Location

It is difficult to determine with any precision the exact reasons why a particular business selects one location as opposed to another. Economic location theory focuses attention on major cost components including labor, transportation, utility rates, taxes, etc. However, while such factors are important, there are many other input costs

which by themselves may seem insignificant. But, when these seemingly small factors are taken collectively, they often are more important than the major factors listed above. In fact, the major factors typically account for less than 40 percent of overall manufacturing cost. Clearly this total may be increased by adding in direct material costs but even then nearly 30 percent of overall costs are still within the miscellaneous category. In addition, the mixture of input costs by type varies substantially from industry to industry. This requires that truly meaningful location analysis must be industry specific. Unfortunately, industry specific studies are generally very expensive and well beyond the budgets of most development agencies.

This particular study falls somewhere between a general investigation and a comprehensive industry by industry investigation. As a result, the scoring system developed later in this report should be regarded as a subjective approximation of development potential, certainly not a detailed analysis of any one industry. It is intended to allow local developers to focus their attention on plausible sectors so that more specific analysis may be undertaken later.

However, comparative cost studies alone do not fully explain the national pattern of manufacturing activity. Nearly all industries including the major corporations were at one time the result of one individual's efforts. The business grew where the entrepreneur was regardless of comparative costs.

Another important fact which is often overlooked is that the nation did not develop in a uniform manner. Early settlement and manufacturing patterns still play a major role in determining the present shifts in manufacturing activity. Many industries which

are seeking new locations are constrained to locate in areas which are already developed. That is, they are linked to an already existent industrial complex through technology, input requirements, financial institutions, etc.

Labor Costs

Average manufacturing wages in Montana are considerably higher than the national norm and much higher than the prime manufacturing growth area, the southern states. In view of the fact that Montana's per capita income level is lower than the national, this may seem to be a contradiction for some individuals. However, there are two possible explanations which may resolve this apparent conflict. First, there are relatively fewer people employed in Montana which would tend to result in lower per capita income. Second, manufacturing employment in Montana is heavily concentrated in capital intense industries such as food products, smelting, refining, lumber and paper mills, etc. These are all industries which are relatively high paying, thus driving the average manufacturing wage up. Furthermore, there is very little light industry, which generally pays somewhat lower wages.

As a result, comparisons of wages with other states are made with some risk. The unresolved question is .... if a new firm (light industry) located in Montana, would their labor cost be proportionately higher than elsewhere? Unfortunately, current occupational wage rate data are not adequate to answer this question. And as outside firms review Montana's competitive position they may be uncertain about labor costs without an actual market survey. Or, in the worst situation, they may tend to avoid the state since they

may perceive Montana as a high cost area.

Utilities

Electrical and gas rates exhibit far more variation than labor costs. Montana presently is a low utility rate area, particularly for electricity. However, as more thermal (high cost) units are added to the less expensive hydroelectric base, the rates will dramatically rise. In addition, Bonneville power rates for western Montana will sharply increase within the next few years as more equitable pricing policies are adopted. However, it is still likely that Montana will have a slight cost advantage in this area in the longer term, but the advantage will not be as significant as it is today. It is important to keep in mind, however, that utility rates are usually not a major cost item for most manufacturing firms.

Taxes

The effect of taxation on manufacturing location remains a hotly debated consideration among developers. However, overall business taxes usually constitute less than 2 percent of total production cost at the national level. While taxes paid per $100 of profits vary substantially from state to state, the relative cost of taxes remains relatively low, probably less than a 1 percent variation between states. A recent study by the Academy for Contemporary Problems in Columbus, Ohio, indicates that business taxes are generally about 30 percent lower than the national average in the southern states and that Montana is somewhat higher than the national average. However, these figures are based on estimates and do not reflect differences in the relative profitability of business from state to state. Overall tax burden in

Montana, perhaps a more representative figure, depicts a very different situation with Montana being substantially lower than the national average (see following table).

The main argument concerning the influence of taxes on business development is probably mute since nearly all empirical studies indicate that state taxes have no measurable impact on business location patterns or industrial growth.

Transportation

Transportation costs generally account for about 2 percent of total manufacturing cost although the variation between industries is significant, ranging from a low of less than 1/2 percent to over 7 percent depending upon the product. Since Montana is far removed from national population centers (markets), it would seem appropriate that development efforts should focus on products which have relatively low transportation costs or are weight losing during manufacture. Estimates of overall access to national markets by Western Analysis suggest that Montana's relative transportation costs may be as much as 50 percent higher than the average state and nearly 100 percent higher than most states in the "manufacturing belt".

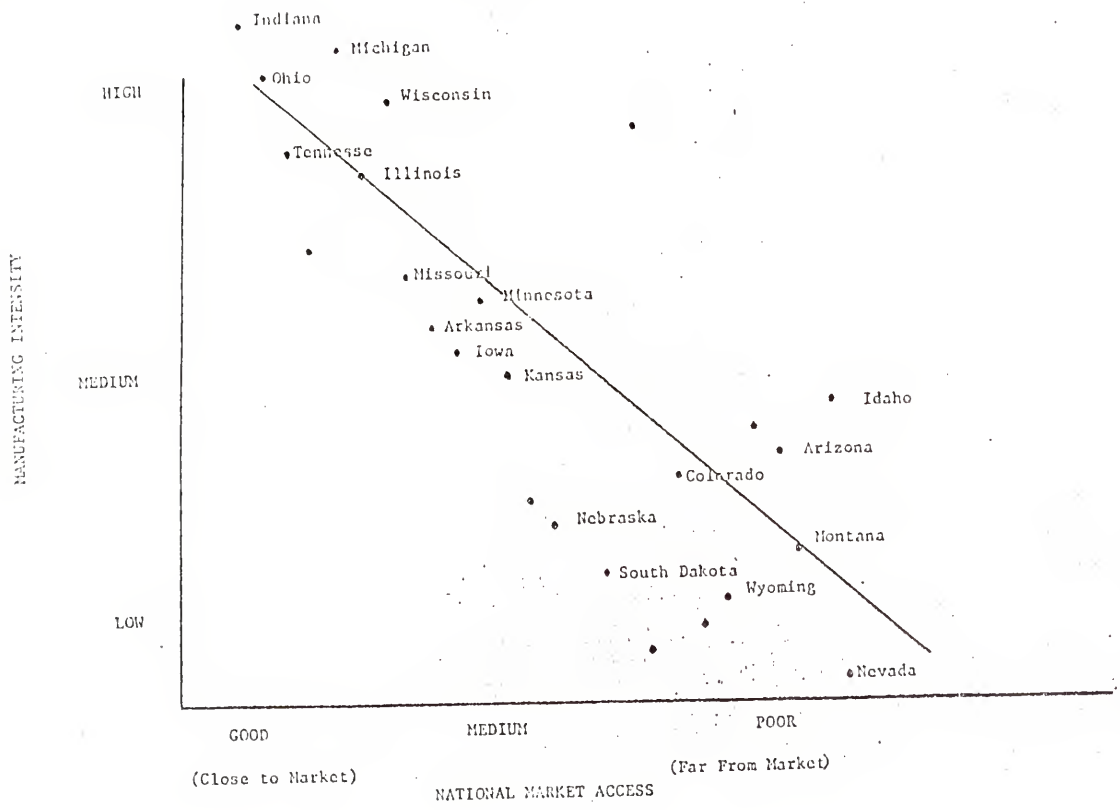
The following graph of market access for landlocked states and manufacturing intensity indicates a fairly strong degree of association between the two variables. For the purposes of this report, market access is defined as an approximation of the relative transportation costs of serving the entire nation from one state. Manufacturing intensity is defined as the percent of state income that is related to manufacturing income.

When reviewing the graph it is important to keep in mind that

MANUFACTURING INTENSITY

AND

MARKET ACCESS



early settlement patterns played a major role in determining the initial location of manufacturing activity. However, as further population shifts occur, particularly in the west, Montana's relative access may improve somewhat. Furthermore, it is clearly not necessary for a Montana firm to supply the entire nation. Regional markets may be more appropriate.

A State Overview of Costs

The following table provides a state cost comparison (1974 data) in terms of labor, utility rates, taxes and transportation. With the exception of the transportation variable all data were supplied by Chase Econometrics and the U.S. Department of Labor. The data are expressed in index form where 100 represents the national average. When an index value is less than 100 the cost in that particular category is lower than the national norm. On the other hand, when the value exceeds 100 the relative costs are higher.

In order to present the data in a more meaningful way the five cost components were averaged based on the relative input costs of manufacturing. These weights were determined using the national input/output tables. For example, labor costs represent 81 percent of the overall index, utilities 6.0%, and taxes and transportation 6.5% each. This composite index was computed by Census region and

---

Technical note:

The following algorithm was used to approximate market access for each of the contiguous states.

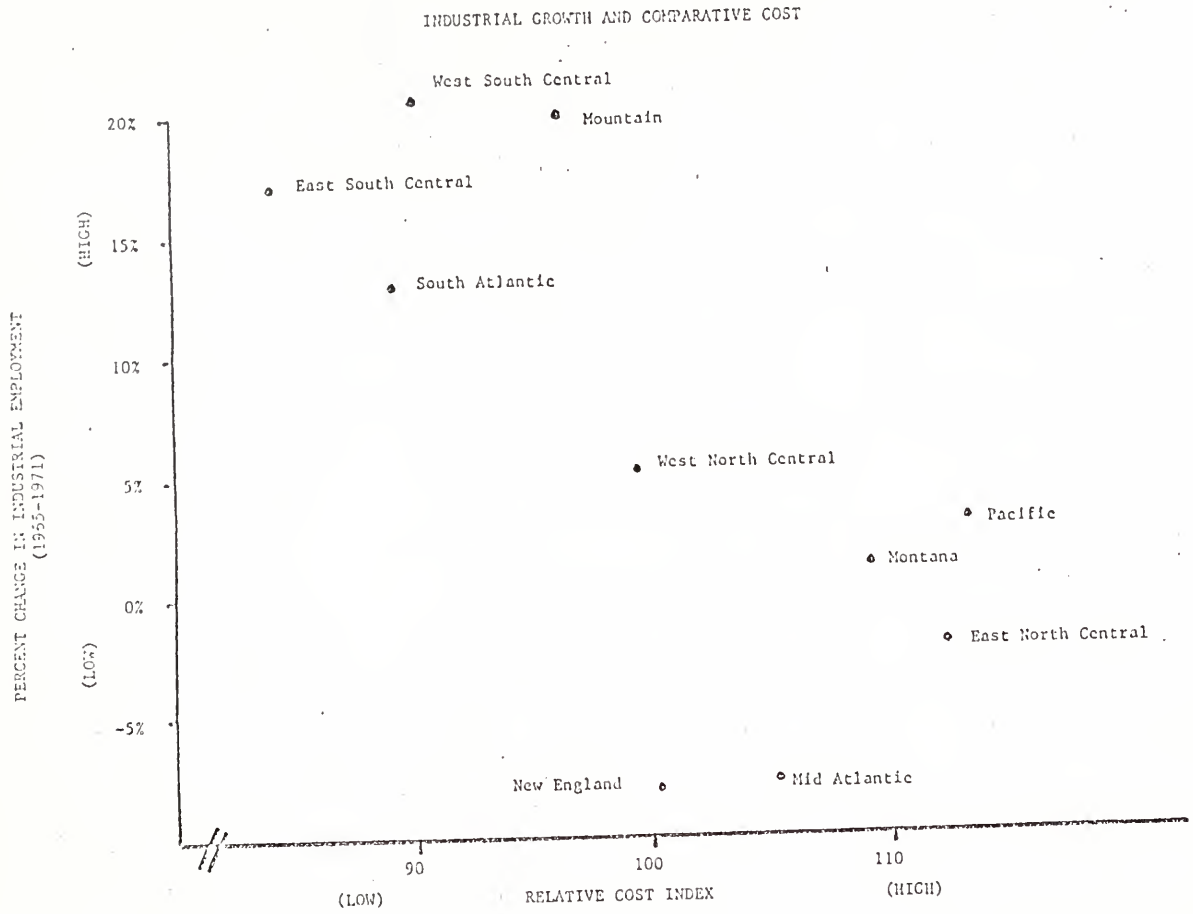
$$\text{Market Access}_{\text{State}_j} = \sum_{j=1}^{48} \text{Population}_{\text{State}_j} \times \text{Distance from State}_i \text{ to State}_j$$

All data are from the 1970 Census. Distances are computed between population centroids for each state. This represents linear as opposed to highway or rail distance.

STATE COST COMPARISON

INDEX VALUES

	Wage Rate	Electricity	Gas	Taxes	Transportation
Alabama	87	74	71	102	74
Arizona	102	108	71	104	143
Arkansas	77	91	57	102	78
California	109	100	76	98	177
Colorado	106	93	53	85	116
Connecticut	103	159	199	88	97
Delaware	107	143	104	130	84
Florida	87	110	81	98	90
Georgia	82	94	79	98	74
Idaho	102	46	82	98	158
Illinois	113	101	95	88	71
Indiana	116	92	85	80	68
Iowa	113	101	77	91	80
Kansas	97	87	52	91	87
Kentucky	100	64	82	114	68
Louisiana	102	75	49	121	83
Maine	82	107	245	108	116
Maryland	107	129	115	99	81
Massachusetts	97	171	192	101	104
Michigan	129	112	104	106	71
Minnesota	108	109	78	129	85
Mississippi	74	95	68	123	77
Missouri	101	109	73	79	75
MONTANA	114	36	64	86	145
Nebraska	94	88	65	73	91
Nevada	112	76	78	104	162
New Hampshire	85	129	162	64	104
New Jersey	106	152	122	68	90
New Mexico	77	90	56	139	120
New York	105	118	137	117	90
North Carolina	76	88	100	110	77
North Dakota	89	144	74	82	106
Ohio	118	84	99	73	70
Oklahoma	92	73	55	93	88
Oregon	116	32	95	87	194
Pennsylvania	106	121	109	110	80
Rhode Island	84	174	198	100	104
South Carolina	77	80	88	116	75
South Dakota	88	116	61	71	93
Tennessee	84	63	72	89	70
Texas	94	70	59	81	96
Utah	91	93	49	110	143
Vermont	84	101	98	89	100
Virginia	88	136	90	129	78
Washington	121	23	83	109	193
West Virginia	111	112	95	129	71
Wisconsin	106	88	90	119	74
Wyoming	113	73	44	95	125


INDUSTRIAL GROWTH AND COMPARATIVE COST
West South Central
Mountain
East South Central
South Atlantic
West North Central
Pacific
Montana
East North Central
New England
Mid Atlantic
20%
15%
10%
5%
0%
-5%
(HIGH)
(LOW)
PERCENT CHANGE IN INDUSTRIAL EMPLOYMENT (1955-1971)
90
100
110
(LOW)
RELATIVE COST INDEX
(HIGH)

is shown on the following graph along with manufacturing growth. As can be seen, the southern and mountain states have experienced more rapid growth and have relatively lower costs. Conversely, the old manufacturing belt states and the Pacific region have experienced slower growth and have relatively higher costs. Montana's costs are also quite high and growth has been rather slow. But, as mentioned earlier there are far more determinants of manufacturing activity than simple labor, energy, transportation costs, etc. Several such factors are discussed below.

External Linkages

Manufacturing firms often locate in areas where they have both an immediate market and an immediate source of inputs including specialized labor, technical assistance, large financial institutions and the availability of related manufacturing firms and shops. Generally, such advantages are found in large urban areas.

There are very few significant linkages within the Montana economy. With the exception of the mining, wood products, and to a limited degree the agricultural complex, manufacturing firms in the state are virtually independent. That is, they are not functionally tied through internal sales or technology.

In the screening matrix four different types of linkages are considered. They include A) Forward linkages; meaning that the industry tends to locate near the consumer of its product, B) Backward linkages; meaning that the industry tends to locate near its materials' suppliers, C) Concentration Dependence; meaning that a firm tends to locate near other firms of its own industry to achieve cost savings by sharing facilities or services, and D) Urban Orientation; meaning

that a firm achieves cost savings by sharing the services of supporting industries typically located in metropolitan areas.

Raw Material Orientation

Some, but relatively few manufacturing firms are tied to the natural resource base. However, in Montana a raw material orientation has been the rule rather than the exception. Nearly 75 percent of manufacturing activity in the state is directly linked to the resource base, a proportion which is probably higher than nearly any other state.

Transportation cost of raw materials is the dominate location factor for many Montana industries. That is, it is not feasible to transport raw ore, uncut timber, etc., for any great distance. It becomes necessary to at least partially process the material to reduce cost.

The Screening Matrix

The screening matrix is an attempt to place the likelihood of the development of a particular industry in perspective by comparing in a general way the requirements of industry with the advantages and disadvantages of locating in Montana.

Industrial characteristics data were collected for 271 manufacturing sectors by SIC (Standard Industrial Classification) code. An example of the worksheet used to evaluate the development potential of each industry is shown below.

The characteristics are divided into four main categories which include labor, general costs, market structure, and other considerations. Not all of the 26 factors were used to assess industry potential since some of the variables are not actual location determinants

SCREENING MATRIX
WORKSHEET

Industry No. _____

Industry _____

SIC# _____

INDUSTRIAL CHARACTERISTICS:

LABOR	1)	Employment	_____
	2)	Wage Rate	$ _____
	3)	Labor Requirements	_____
	4)	Female Employment	_____ %
	5)	Value Added	_____ %
COSTS	6)	Employee Compensation	_____ %
	7)	Business Taxes	_____ %
	8)	Rail	_____ %
	9)	Motor Freight	_____ %
	10)	Electric Utilities	_____ %
	11)	Gas Utilities	_____ %
	12)	COMPOSITE COST	_____
MARKET	13)	Growth Rate	_____ %
	14)	Market	_____
	15)	Raw Material Orientation	_____
	16)	Urban Orientation	_____ %
	17)	Concentration Dependence	_____
	18)	Linkages	_____
OTHER	19)	Capital/Labor Intense	_____
	20)	Product	_____
	21)	Transportation Costs	_____
	22)	Rail Shipments	_____ %
	23)	Motor Carrier Shipments	_____ %
	24)	Water Use/Discharge	_____
	25)	Energy Use	_____
	26)	OVERALL SCORE	_____

but serve more of a general background description of each sector. Furthermore, several of the factors are designed to assess the broad desirability of the industry as opposed to its economic feasibility. Each of the factors is described below. All data are national in scope.

1) Employment: Average number of employees per establishment, U.S. Department of Commerce, Bureau of the Census, Census of Manufacturing, 1967. These data are useful for determining the general labor requirements of each sector.

2) Wage Rate: Average hourly earnings, 1972 dollars, U.S. Department of Commerce, Bureau of the Census, Census of Manufacturing.

3) Labor Requirements: Skill levels are coded as follows --

S	skilled
SS	semi-skilled
C	cheap or unskilled

Derived from the 1970 Census of Population, U.S. Department of Commerce, Bureau of the Census and RD Newsletter No. 53-70, April 1970, Texas Agricultural Extension Service.

4) Female Employment: The percent of female employment in each sector, 1970 Census of Population, U.S. Department of Commerce, Bureau of the Census.

5) Value Added: Value added provides an indication of the degree of overall processing. The figure expressed as a percent of total manufacturing costs includes labor, profits, and business taxes. The value added increases as more processing takes place. In other words, intermediate or partly finished products have a low value added while final products have a higher value added. Data are from the 1967 (national) Input/Output Tables, U.S. Department of Commerce.

6-11) These cost figures provide an indication of the relative importance of labor, utilities, and transportation costs to each industry. The figures are expressed in percent of total manufacturing costs. Derived from the 1967 Input/Output Tables, U.S. Department of Commerce.

12) Composite Cost: This figure represents an overall cost index based on Montana's relative labor costs, taxes, utility rates and transportation costs. The figures range from 86 to over 100. A figure of less than 89 denotes high costs, and over 91 low costs. An example should help to explain how the index was computed.

Industry #96 in the matrix had the following input cost characteristics; see variables 6-11.

A)	Employee Compensation	19.6%
	Taxes	.7%
	Rail	.4%
	Motor Freight	.7%
	Electricity	.1%
	Gas	.0%
		21.5%

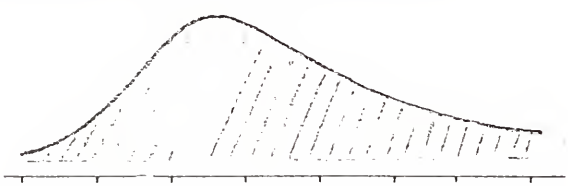
Each input cost (percent) was weighted by Montana's relative cost index as follows:

B)	Wages	19.6 x 1.14	22.344
	Taxes	.7 x .86	.602
	Rail	.4 x 1.45	.580
	Motor Freight	.7 x 1.45	1.015
	Electricity	.1 x .36	.036
	Gas	.0 x .64	.000
			24.577

The sum found in step A was divided by the sum found in step B so the index for this industry is:

$$\frac{21.5\%}{24.58\%} = .875 \text{ or } 88$$

It is important to note that this index is at best a gross approximation of comparative costs in this industry. The index values are centered around 88-89 and have the following distribution:



86 87 88 89 90 91 92 94

High Cost — Low Cost

The uses of this index are explained in greater detail in the next section.

13) Growth Rate: Percent increase in employment by sector (1960-1975), Employment and Earnings, U.S. Department of Labor, Bureau of Labor Statistics.

14) Market: Markets are defined as local (coded L), regional (coded R), or national (coded N), R.D. Newsletter No. 53-70, April 1970, Texas Agricultural Extension Service.

15) Raw Material Orientation: An industry was coded X if a raw material orientation existed, R.D. Newsletter.

16) Urban orientation: The percent of firms located in urban areas. This variable ranged from 20 percent to over 80 percent. U.S. Department of Commerce, Industrial Location Determinants 1971-1975.

17) Concentration Dependence: An industry with a concentration dependence was coded X. R.D. Newsletter.

18) Linkages: An industry with a forward linkage was coded F and an industry with a backward linkage was coded X. R.D. Newsletter and Battelle -- Columbus Laboratories, Selection of Desirable and Feasible Industries, 1974.

19) Capital/Labor Intense: Capital intense industries were coded C and labor intense industries were coded L. R.D. Newsletter.

20) Product: Intermediate products were coded I and final products coded F. R.D. Newsletter.

21) Transportation Costs: Transportation costs relative to the value of the product were coded high (H) or low (L). R.D. Newsletter.

22-23) Rail and Motor Carrier Shipments: The percent of shipments made by either type of mode. Battelle-Columbus Laboratories.

24-25) Water and Energy Use: Coded high (H), medium (M), or low (L). Battelle-Columbus Laboratories.

Overall Score

Each industry was assigned an overall score based on the information contained on the matrix worksheets (see Appendix). The weighting

scheme is admittedly subjective but should provide developers with at least a "starting point" in terms of general feasibility. Discretion, of course, must be used with respect to this index. The following weights and rationale were used to determine the overall score.

I) It is assumed that the most likely type of firms to develop in Montana will be relatively small since the state does not possess a large available labor force. Points were given as follows:

Employment	Points
0-150	3
151-300	2
301 >	1

II) Composite Costs: Points were given based on the composite cost index as follows:

Cost Index		Points
High	86-88	1
Medium	88-89	2
Low	91 >	3

In other words, the scoring system places a greater chance of success on low-cost industries as defined earlier.

III) Growth Rate: Rapid growth industries were assumed to have a greater chance of success than slow growth or declining sectors.

Growth Rate		Points
Low	less than 10%	1
Medium	11% - 30%	2
High	31% >	3

IV) Urban Orientation: Firms with a lower urban orientation were assumed to be more feasible prospects for Montana.

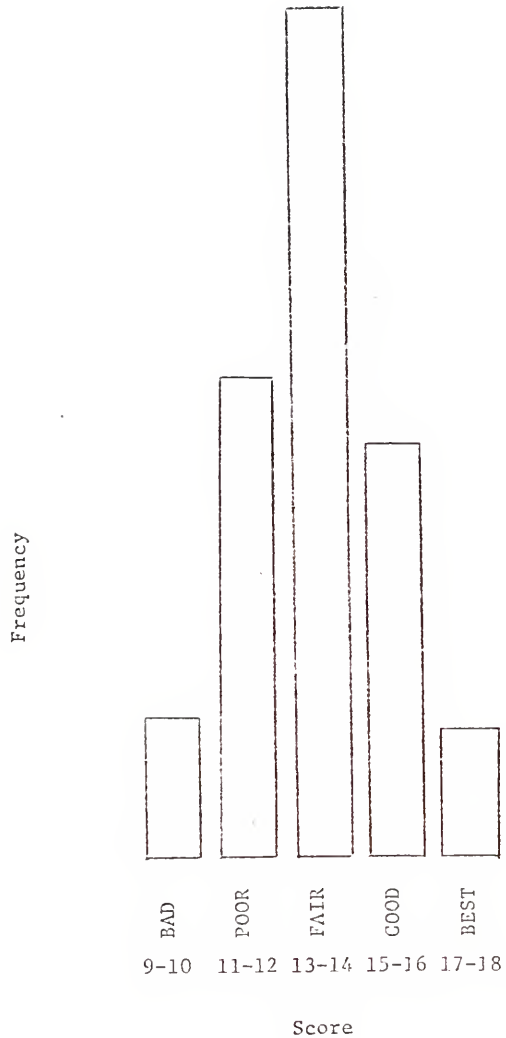
Urban Orientation		Points
Low	0-50%	3
Medium	51-70%	2
High	71% >	1

V) Concentration Dependence: If a firm had a concentration dependence and support facilities were available, 3 points were given. If concentration dependence was not relevant, 2 points were given. If a firm had a concentration dependence, and support facilities were not available, 1 point was given.

VI) Raw Material Orientation: If a firm had a raw material orientation and raw materials were present 3 points were given. If raw materials were not relevant, 2 points were given. If raw materials were relevant, but not available, 1 point was given.

VII) Linkages: If either a backward or forward linkage was relevant and present, 3 points were given. If a linkage structure was not relevant, 2 points were given. If either a backward or forward linkage was relevant and not available, 1 point was given. If both types of linkages were relevant and neither one available, 0 points were given.

In using this sorting procedure the maximum score for a particular industry was 21 and the minimum score 6. Actual scores ranged from 9 to 18 and were distributed in the following way:



(Average Score 13.5)

Comparison of Industries

Many of the firms which already exist in Montana scored the highest, which is expected. The following comparison of selected firms illustrates the general degree of feasibility as defined by the matrix.

Best 17-18 points	Meat Processing Animal Fat Oils Cardboard Building Paper Furniture Pulp Copper/Lead/Zinc
Good 15-16 points	Plywood Prefab Buildings Paper Mills Aluminum Castings Farm Machinery Grain Products Paper Containers
Fair 13-14 points	Clothing Greeting Cards Hardware Hand Tools Electronic Components Surgical Supplies Rolling and Drawing
Poor 11-12 points	Tires Iron Foundries Power Transmission Equipment Construction Machinery Railroad Cars Motor Vehicles Engines
Bad 9-10 points	Turbines Aircraft Textile Machinery Refrigerators Machine Tools Steel Works Ship Building

A complete ranking of industries (271) is provided in the Appendix along with the 26 variables contained on the matrix worksheets. It should be noted, however, that a high score does not necessarily mean that the industry will succeed in Montana but only that it may have an advantage relative to other industries. For example, meat processing was rated high in the matrix but many such firms have failed in Montana even with good management. The type of beef slaughtered in Montana is very different in nature than that processed in Nebraska, Iowa, etc., where larger markets also exist. Pulp mills scored high, but future development of this industry is possibly constrained by limited inputs, i.e., wood residue inputs. In other words, mill facilities would probably have to expand before further pulp development could occur.

In addition, many industries which scored high in the matrix have limited markets. For example, lime, ice, petroleum coal products, dairy, and concrete products were rated high but are obviously not products with a national market orientation.

As a result, further screening will be necessary to eliminate those sectors with local markets if it is the desire of the community to promote regional or national manufacturing firms.

Common Characteristics

The following table which shows general industrial characteristics should be carefully reviewed before turning to the actual matrix. Several generalizations may be drawn from the table.

I) Montana's best development potential is probably in the resource based industries, even though the overall growth rate is low and transportation cost high with respect to the value of the product.

COMMON CHARACTERISTICS
BY SCORE

Score	Employment Level	Wages	Value Added	Transp. Costs	Energy Use	Growth Rate	Market	Raw Mat'l Orient'n	Urban Orientat'n	Linkages	Other
Best 17-18	Medium	High	Low	High	Medium	Low	Regional	Dominate	Low	Backward only	Natural Resource Orientation
Good 15-16	Low	Medium	Medium	Medium	Low	Medium	Regional	Not Important	Low	Usually Backward	Generally Footloose
Fair 13-14	Low	Low	High	Low	Low	High	National	Not Important	Medium	Not Important	Footloose
Poor 11-12	High	High	High	Low	Medium	Low	National	Not Important	High	Forward and Backward	Market Orientation
Bad 9-10	Very High	High	High	Medium	High	Very Low	National	Not Important	High	Forward and Backward	Market Orientation

Note: Characteristics were developed on the basis of the industrial ranking produced from the screening matrix.

II) Value added is much higher in those sectors which have a strong market orientation. Montana communities may find it necessary to focus development efforts on medium value added products. High value added products generally have high employment levels, national markets and a strong urban orientation which may preclude such development here.

III) With the exception of the resource based industries, manufacturing firms which appear to have a realistic chance of development in Montana, will typically pay somewhat lower wage rates than large scale firms.

IV) The high employment requirements of industries in the fourth and fifth categories will probably preclude such development in Montana. These firms are also slow growth industries and have a high urban orientation. Montana should focus on industries employing relatively few workers.

V) The fastest growth industries are generally footloose, that is, not tied to a natural resource base or market orientation. Wages and employment requirements are generally lower than average. Transportation costs are also relatively low. These industries appear to be realistic growth candidates for Montana.

VI) Montana should focus on industries which have a relatively low degree of urban orientation. The linkage and market structure of these industries present fewer constraints for development.

VII) Industries with agglomeration economies (i.e., linkages and scale effects are important) are not likely growth candidates in Montana.

VIII) The industries with the highest potential for development appear to generally have regional markets.

IX) Even though the highest two development categories have relatively high transportation costs, weight is lost during manufacture which tends to compensate for Montana's transportation disadvantage. However, in some cases developers may wish to focus on industries which have relatively low transportation cost, i.e., the footloose industries.

X) With the exception of the resource based industries, the development potential for Montana appears to be in industries which are relatively low energy users.

General Comments on Specific Industries

Nearly all of the industries included in the best category have a strong natural resource orientation. Most of the industries in this group are already present in Montana and many of them are slow or no growth industries.

Meat Processing:

Meat Processing plants may be faced with market disadvantages in Montana. This industry generally has a regional market orientation and has experienced very little growth nationally. Transportation costs are relatively high and value added very low. In addition, the long-term slaughter output in Montana has been declining. Sufficient regional markets may not exist and may be hampered by the nature of the product, i.e., generally cull cattle; low grade. In the fed beef category, plants may be faced with uncertain supplies of beef unless specific arrangements can be made with producers.

Other Agricultural Products:

Fish processing appears high on the list and may develop if trout farming development takes place first. Canned fruits and jam, etc., (Flathead area) also appears to have strong potential for development. Supplies are, however, very prone to climatic whims in localized areas.

Grain Processing:

Flour milling related employment has declined by nearly 30 percent at the national level since 1960. Even though Montana has the raw resource, milling development in Montana will face a major constraint since the overall industry is declining. Production generally has a strong port orientation which could present problems for Montana.

Miscellaneous Food Processing:

Ice, dairy products, and beverages (non-alcoholic) are high on the screening list. Markets, however, are strictly local.

Pulp/Paper/Plywood:

Much of the employment growth in the wood products industry has been in this category. However, a recent report by the Montana Bureau of Business and Economic Research suggests that future expansion in paper and pulp production may be constrained by the somewhat fixed output of existing mills which supply the primary input. Changes in technology, however, may allow forest residue to be used as an alternative. Pulp mills have also lost employment nationally within the last ten years.

Paperboard, plywood, and paper containers appear to have good potential for Montana. At least, there has been significant growth at the national level. However, these industries may also be faced with supply problems. In addition, present facilities may not be geared for this type of product. Also, many paper products (bags, containers, etc.) appear to have a strong market orientation.

Other Wood Products:

Furniture, prefab buildings, and wood shelving have experienced fairly rapid employment growth at the national level. The value added during the production process is also high. However, such markets are generally regional in nature primarily as a result of transportation costs.

Primary Metals:

Employment in this sector has grown slowly at the national level and has rapidly declined in Montana since 1970, largely as a result

of more efficient technology. Zinc processing has virtually disappeared in Montana, gold has been stable, and copper output fallen somewhat since the closing of underground operations in Butte. National output projections for copper are favorable but may have very little impact on employment. Aluminum production at Columbia Falls "may" face problems as BPA electrical rates increase. Also, primary metals will continue to face tightening environmental regulations which will very likely constrain employment growth in this industry. However, the potential for increased casting activity, rolling and drawing, and the further manufacture of metal products appears good: aluminum castings, barrels/kegs, foil and leaf, pipe and fittings, etc.

Refining:

Employment in refining in Montana has been very stable for nearly twenty years. Assuming no future supply problems, employment is likely to remain stable in the future. Certain products appear high on the potential list such as petroleum coal products (asphalt) but high transportation costs would very likely limit extensive development of this product.

Other Minerals:

Lime, gypsum, and concrete products appear relatively high on the screening list. Markets for such products are, however, generally local in nature.

Clothing:

Employment growth in certain types of clothing (mens'/boys' trousers and work clothing) has been above the national rate for manufacturing. However, most types of clothing including leather

and fur goods have experienced very little growth or have actually lost employment. Wage rates in this industry are generally low and female participation very high. Furthermore, the industry has a slight tendency to locate in urban areas.

Footloose Industries:

Footloose industries represent industries that are not directly tied to raw materials or urban areas. Nearly all of the national manufacturing growth has been in this area. Employment requirements are low, transportation costs low, growth is high and energy use is low. Markets are generally subnational. These industries are perhaps the best prospect for Montana. Competition, of course, is strong for this type of industry. Examples are included in the following table, however, it is suggested that the reader individually evaluate each industry within this category by reviewing the Appendix.

EXAMPLES OF

REASONABLE POTENTIAL

FOR NEW LIGHT MANUFACTURING

SIC	NAME
3361	Aluminum Castings
3522	Farm Equipment
265	Paper Boxes
3079	Misc. Plastic Products
3421	Cutlery
3425	Hand Saws and Blades
349	Pipes and Fittings
3732	Boat Building
3851	Ophthalmic Goods
3949	Sporting Goods
2542	Metal Partitions
3423	Hand Edge Tools
3429	Hardware
3537	Industrial Trucks and Tractors
3641	Electric Lamps
3642	Lighting Fixtures
3674	Semiconductors
3679	Electronic Components
364	Wire
3791	Trailer Coaches
3841	Surgical Supplies
3843	Dental Supplies

Desirability Criteria

Several of the variables included in the matrix may be used to subjectively evaluate the desirability of a particular type of development. Such factors include:

A) Wage rates
B) Skill requirements
C) Female employment
D) Value added
E) Capital/labor intensity
F) Energy and water use

That is, community development efforts may wish to eliminate high energy or water consumers, low wage rate industries, etc., from consideration. However, the range of possible development opportunities may be greatly reduced in the process of being more selective, even though the procedure may be more consistent with overall community goals.

Site Specific Criteria

An automated site specific industry requirement matching service is available to all Montana communities and development agencies. This free service is provided by the U.S. Department of Commerce and matches firms which are seeking new locations with the site specific characteristics of interested communities.

This service, in conjunction with the screening matrix, may be an important aid to local development groups for several reasons. First, the service provides manufacturing firms with a list of communities which share the attributes which they prefer. Second, the output of the EDA program may be more closely reviewed in light of the national location determinants as discussed in this document. Third, once a realistic set of industries is defined using both

procedures, communities may begin to improve marketing information packages that are more closely linked with the types of development which appear to be most realistic. That is, communities may wish to design promotional literature around a select type of industry.

Communities interested in this service should contact the Governor's Office of Commerce and Small Business Development, Capitol Station, Helena, Montana, 59601.

Other Extensions

The screening matrix included in the Appendix is cross referenced by SIC code. Once a desirable/feasible set of industries is determined, and appropriate marketing literature developed, the more aggressive communities may wish to pursue an actual solicitation program.

Several national firms specialize in this type of analysis and promotion. A list of such firms is available from the Office of Commerce.

More specific industrial prospectus, mailing labels, financial reports, etc., may be purchased (for a fee) from such industrial research firms. However, because of the relatively high cost of detailed studies, promotional mailings, etc., it is suggested that communities limit or focus their efforts on industries which they regard as most realistic. The screening matrix and EDA matching service should be of help in this regard.

A General Comment on Community Development

Success in community development, or business, is the direct result of persistence and common sense. In order for a development program to have any measurable impact, such an effort must contain a core group of professional businessmen who are willing to sacrifice

a great deal of effort, including perhaps personal finances, over an extended period of time. Desirable development is not a random event, but the direct product of someone's efforts.

Furthermore, development is often likely to be an internal product (a new local or expanded firm) as opposed to the location of an outside industry.

Conclusions and Suggestions

The screening matrix should provide local development agencies with an improved understanding of the types of location determinants which effect Montana. Obviously, this document can provide only a general guide as to what is feasible or infeasible. And if the approach is to be useful at all, it will be necessary to carefully review the Appendix which contains the industry specific characteristics. Furthermore, small cities will find it necessary to aim for a somewhat different set of industries than Billings, Missoula, Great Falls, etc.

This report no doubt raises more questions than it answers since it is only a "working document". There is a need for more comprehensive analysis of specific industry potential well beyond the scope of this paper which is largely educational. The development potential of Montana is often downplayed by professional researchers. What is needed is a careful blend of entrepreneurial ability and business research. And clearly, without the first element, the second may be redundant.

APPENDIX
PART I

Industry Ranking

The following ranking of industries by overall score must be treated with considerable discretion. It is virtually impossible to array the potential of manufacturing development with real world accuracy. However, the rankings, appear to be generally rational or at least plausible.

The ranking is included only to try to help local developers select realistic targets. Other screening matrix approaches (Missouri, Washington, Nebraska, etc.) have not been so presumptuous as to rank industrial potential. This is bound to result in argument which is its primary intention.

SIC #	INDUSTRY NAME	Overall Score
201	Meat Processing	18
2094	Animal Fat Oils	18
2644	Wallpaper	18
264	Die Cut Paper and Cardboard	18
264	Building Paper	18
2951	Petroleum Coal Products	18
3274	Lime	18
3332	Primary Lead Production	18
3332	Primary Zinc Production	18
3339	Primary Nonferrous Production	18
2031	Canned Fish	17
2511	Wood Household Furniture	17
2521	Wood Office Furniture	17
2541	Wood Partitions and Shelving	17
2611	Pulp Mills	17
2631	Paper Coating & Glazing	17
3275	Gypsum Products	17
3331	Primary Copper Production	17
2033	Canned Fruits, Jams	16
2036	Fresh or Frozen Fish	16
2097	Manufactured Ice	16
2432	Veneer and Plywood	16
2433	Prefab Wooden Buildings	16
2512	Upholstered Wood Household Furniture	16
2621	Paper Mills	16
2642	Envelopes	16
264	Pressed Molded Pulp Goods	16
2911	Petroleum Refining	16
3334	Primary Aluminum Production	16
3341	Secondary Nonferrous Production	16
3361	Aluminum Castings	16
3352	Farm Machinery and Equipment	16
2026	Milk	15
2037	Frozen Fruit Juices	15
2041	Flour and Grain Products	15
2086	Beverages (Non-Alcoholic)	15
2327	Mens/Boys Separate Trousers	15
237	Curtains and Draperies	15
2522	Metal Office Furniture	15
2647	Sanitary Paper	15
265	Other Paperboard	15

SIC #	INDUSTRY NAME	Overall Score
265	Set-up Paperboard Boxes	15
265	Corrugated Fiber Boxes	15
265	Sanitary Food Containers	15
265	Fiber Cans, Tubes, Drums	15
284	Soap and Detergents	15
284	Specialty Cleaning Products	15
284	Surface Active Agents	15
3079	Misc. Plastic Products	15
3272	Other Concrete Products	15
3273	Ready-mixed Concrete	15
3281	Cut Stone	15
3296	Mineral Wood	15
3299	Nonmetallic Products	15
3421	Cutlery	15
3425	Hand Saws & Saw Blades	15
347	Electroplating	15
3471	Coating, Engraving, etc.	15
3499	Metal Shipping Barrels and Kegs	15
3492	Safes and Vaults	15
3493	Steel Springs	15
3493	Valves, Pipe Fittings	15
3497	Metal Foil and Leaf	15
349	Fabricated Pipes & Fittings	15
3499	Fabricated Metal Products	15
3432	Mining Machinery & Equipment	15
3533	Oil Field Machinery & Equipment	15
3576	Scales and Balances	15
3636	Sewing Machines	15
3732	Boat Building & Repairing	15
3851	Ophthalmic Goods	15
3931	Musical Instruments	15
3949	Sporting Goods	15
2096	Shortening, Margarine	14
224	Manmade Fiber Silk Finishers	14
232	Mens/Boys Neckwear	14
232	Mens/Boys Shirts & Collars	14
2328	Mens/Boys Work Clothing	14
233	Other Women/Misses Outerwear	14
237	Textile Bags	14
237	Schiffli Embroideries	14
237	Other Fabricated Textiles	14
244	Wirebound Boxes & Crates	14
244	Veneer Plywood Containers	14
2531	Public Building Furniture	14
2542	Metal Partitions & Shelving	14

SIC #	INDUSTRY NAME	Overall Score
2591	Venetian Blinds & Shades	14
2647	Bags, Minus Textile Bags	14
2771	Greeting Cards	14
281	Industrial Gases	14
281	Inorganic Pigments	14
281	Inorganic Chemicals	14
2821	Plastic Materials & Resins	14
2824	Biological Products	14
2851	Carbon Black	14
3261	Vitreous Plumbing Fixtures	14
3291	Abrasive Products	14
3357	Nonferrous Wire Drawing	14
3362	Nonferrous Castings	14
3423	Hand Edge Tools Minus Saws	14
3429	Hardware	14
3481	Misc. Fabricated Wire Products	14
3496	Collapsible Tubes	14
3537	Industrial Trucks & Tractors	14
3361	Pumps and Compressors	14
3564	Blowers and Fans	14
3565	Industrial Patterns	14
3579	Other Office Machines	14
3581	Automatic Vending Machines	14
3582	Commercial/Laundry Equipment	14
3622	Industrial Controls	14
3641	Electric Lamps	14
3642	Lighting Fixtures	14
3643	Current Carrying Wire Equip.	14
3644	Noncurrent Carrying Wire	14
3652	Phonographic Records	14
3674	Semiconductors	14
3679	Electronic Components	14
3692	Primary Batteries	14
3713	Trucks and Bus Bodies	14
3715	Truck Trailers	14
3751	Motorcycles, Bicycles	14
3791	Trailer Coaches	14
3799	Transportation Equipment	14
3831	Optical Inst. and Lens	14
3841	Surgical and Medical Inst.	14
3842	Surgical Appliances & Sup.	14
3843	Dental Equipment Supplies	14
3861	Photographic Equipment	14
395	Pens - Pencils	14
395	Pencils, Crayons, Artists Mat.	14
395	Carbon Paper/Inked Ribbon	14
3994	Morticians Goods	14

SIC #	INDUSTRY NAME	Overall Score
3999	Misc. Manufacturing	14
201	Poultry	13
2034	Dried Fruits	13
2044	Rice Milling	13
2091	Cottonseed Oil Mills	13
2093	Other Vegetable Oil Mills	13
2095	Roasted Coffee	13
211	Cigarettes	13
212	Cigars	13
213	Tobacco and Snuff	13
234	Millinery	13
237	Leather Clothing	13
237	Other Apparel & Accessories	13
N.A.	Other Household Furniture	13
2599	Other Furniture & Fixtures	13
281	Dyes, Cyclic Crudes	13
281	Organic Chemicals	13
2822	Synthetic Rubber	13
283	Medicinal Chemicals	13
2834	Pharmaceutical Preparation	13
2844	Perfumes, Cosmetics	13
3031	Reclaimed Rubber	13
3069	Rubber Products	13
3293	Gaskets Packing	13
3352	Aluminum Rolling & Drawing	13
3356	Rolling and Drawing	13
3411	Metal Cans	13
3431	Iron Metal Sanitary Ware	13
3432	Brass Plumbing Fittings	13
3446	Architectural Metal Work	13
3449	Misc. Metal Work	13
3451	Screw Machine Products	13
3461	Metal Stampings	13
3534	Elevators	13
3535	Conveyors	13
3536	Hoists, Cranes, Monorails	13
3544	Special Dies, Tools, Die Sets	13
3545	Machine Tool Accessories	13
3548	Metal Working Machinery	13
3569	Other Industrial Machinery	13
3573	Electronic Computing Equipment	13
3585	Refrigeration Equipment	13
3586	Measuring & Dispensing Pumps	13
3589	Service Industry Machines	13
3611	Electric Measuring Equip.	13
3613	Switchgear, Switchboard Equip.	13
3624	Carbon and Graphite	13

SIC #	INDUSTRY NAME	Overall Score
3624	Electric Houseware & Fans	13
3639	Household Applicances	13
2694	Electrical Equip. for Engines	13
3714	Motor Vehicle Parts	13
3821	Mechanical Measuring Devices	13
387	Watchcases	13
3993	Signs & Advertising Displays	13
227	Linoleum & Floor Covering	13
207	Candy Products	12
214	Tobacco Steming Redrying	12
2515	Mattresses and Bed springs	12
273	Books Publishing & Printing	12
2741	Other Publishing	12
2824	Synthetic Organic Fibers	12
2851	Paints, Varnishes, Enamels	12
3011	Tires and Inner Tubes	12
322	Pressed and Blown Glass	12
322	Products of Purchased Glass	12
332	Cold Rolled Steel Sheets & Bars	12
3321	Gray Iron Foundries	12
3433	Nonelectric Heating Equipment	12
3442	Metal Doors, Sash, Frames	12
3452	Bolts, Nuts, Screws, Washers	12
3519	Internal Combustion Engine	12
3531	Construction Machinery	12
3542	Metal Forming Machine Tools	12
3551	Food Products Machinery	12
3553	Woodworking Machinery	12
3562	Ball and Roller Bearings	12
3566	Power Transmission Equipment	12
3567	Industrial Furnaces and Ovens	12
3612	Power Transformers	12
3629	Electrical Apparatus	12
3631	Household Cooking Equipment	12
3651	Radio/TV Receiving Sets	12
3672	Cathode Ray Picture Tubes	12
3711	Motor Vehicles	12
3742	Railroad Cars	12
3811	Laboratory Research Equipment	12
387	Watches, Clocks	12
391	Jewelry	12
391	Jewelers Findings	12
391	Lapidary Work	12
391	Silverware & Plated Ware	12
3941	Games & Toys (minus dolls)	12
3942	Dolls	12
3943	Childrens Vehicles	12
3963	Needles, Pins, Hooks, Eyes	12

SIC #	INDUSTRY NAME	Overall Score
207	Chewing Gum	11
207	Chocolate Products	11
2092	Soybean Oil Mills	11
237	Fur Goods	11
2426	Hardwood Dimension Mills	11
2721	Periodical Printing & Publishing	11
275	Typesetting	11
2812	Alkalies and Chlorine	11
2823	Cellulosic Manmade Fibers	11
3021	Rubber Footwear	11
3211	Flat Glass	11
3221	Glass Containers	11
332	Electrometallurgical Products	11
3351	Copper Rolling & Drawing	11
3554	Printing Trades Machinery	11
3559	Special Industry Machinery	11
3572	Typewriters	11
3573	Electronic Computing Equipment	11
3621	Motors and Generators	11
3633	Household Laundry Equipment	11
3673	Electron Tubes Transmitting	11
3731	Ship Building	11
3741	Locomotives	11
3822	Automatic Temp. Controls	11
2711	Newspaper Print & Publishing	10
275	Commercial Printing	10
275	Lithographic Printing	10
275	Engraving	10
331	Blast Furnaces Steel Works	10
332	Malleable Iron Foundries	10
3511	Steam Engines & Turbines	10
3541	Metal Cutting Machine Tools	10
3552	Textile Machinery	10
3632	Household Refrigerators	10
3661	Telephone-Telegraph Equipment	10
3671	Electron Tubes Receiving	10
3729	Aircraft Parts & Equipment	10
391	Costume Jewelry	10
3662	Radio - TV Transmitting Equip.	9
3721	Aircraft	9
3722	Aircraft Engines & Parts	9
37295	Aircraft Propellers & Parts	9

DUCTANG
31230
MADE IN U.S.A.